



## Maeridae, the *Elasmopus* group\*

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### Abstract

In the *Elasmopus* group of maerid amphipods, seven species of *Elasmopus*, six species of *Mallacoota* and two species of *Parelmopus* are reported from the Great Barrier Reef, Queensland, Australia. Five of the 15 species, *Elasmopus slatyeri*, *Elasmopus varanocephalensis*, *Mallacoota capricornia*, *Mallacoota scopulosa* and *Parelmopus cymatilis* are new to science. The Maeridae is diagnosed against all amphipod families and additional genera are assigned to the family.

**Key words:** Crustacea, Amphipoda, Maeridae, *Elasmopus* group, Great Barrier Reef, Australia, new species, taxonomy, *Elasmopus alalo*, *Elasmopus crenulatus*, *Elasmopus hooheno*, *Elasmopus pecteniscus*, *Elasmopus slatyeri*, *Elasmopus spinicarpus*, *Elasmopus varanocephalensis*, *Mallacoota balara*, *Mallacoota capricornia*, *Mallacoota chandaniae*, *Mallacoota nananui*, *Mallacoota schellenbergi*, *Mallacoota scopulosa*, *Parelmopus cymatilis*, *Parelmopus suensis*

### Introduction

The Maeridae Krapp-Schickel, 2008a, is distributed worldwide in shallow water marine and brackish habitats and more rarely in the deep sea. Maerid genera such as *Elasmopus* (89 species), *Ceradocus* (34 species), *Quadrimeaera* (29 species), *Mallacoota* (21 species) and *Maera* (17 species) are very diverse in temperate and tropical environments.

Eleven genera and 33 species of maerids are reported from the Great Barrier Reef (Krapp-Schickel 2009; current study). The majority of species occur among the common genera *Elasmopus* (7 species), *Ceradocus* (6 species), *Mallacoota* (6 species) and *Quadrimeaera* (4 species). Such a high species richness of Maeridae has not been reported from any other reef system. For example Ledoyer (1983) reported seven genera and 13 species from Madagascar reefs.

In this paper we report on the *Elasmopus* group which includes three genera and 15 species on the Great Barrier Reef of which five species are new to science.

### Materials and methods

The descriptions were generated from a DELTA database (Dallwitz 2005) to the maerid species of the world. Material was hand-collected on scuba and is lodged in the Australian Museum, Sydney (AM) and the Museum and Art Gallery of the Northern Territory, Darwin (NTM). A set of colour plates, a list of standard abbreviations and detailed station data is available in Lowry & Myers (2009). A CD (*Benthic Amphipoda (Crustacea: Peracarida) of the Great Barrier Reef: Interactive Keys*) is available with the book or the keys can be accessed at the crustacea.net website.

## Maeridae Krapp-Schickel, 2008a

Several authors (Bousfield 1973, 1977; J.L. Barnard 1972a; Barnard & Barnard 1983; Lowry & Watson 2002; Krapp-Schickel 2009) have discussed groups within the Melitidae Bousfield, 1973. Krapp-Schickel (2008a) formalised one of these groups in the newly established family Maeridae Krapp-Schickel, 2008a. The Maeridae was not fully defined, however, with only one character and two character states given to separate it from the Melitidae (*sensu lato*). Twenty-six genera were listed for the family (Krapp-Schickel 2008a), with an acknowledgement that more genera might await inclusion. In this paper we present a diagnosis that separates the Maeridae from all other amphipod families and we include 40 genera.

**Diagnosis.** Body laterally compressed or sub-vermiform. Head anteroventral corner with notch/slit or anteroventral corner excavate. Antennae 1–2 without calceoli. Antenna 1 longer than antenna 2. Antenna 2 without bulbous article 1. Mandible molar well developed. Coxal gills not stalked. Urosomites 1–3 free. Urosomite 2 without dorsal robust setae. Uropods 1–2, apices of rami with robust setae. Uropod 1 peduncle with basofacial robust seta. Uropod 3 biramous, inner ramus at least half length of outer ramus; outer ramus 1– or 2–articulate, with article 2, when present, short or long, never greatly elongate. Telson laminar.

**Included genera.** Maeridae includes 40 genera: *Anamaera* Thomas & Barnard, 1985a; *Anelasmopus* Oliveira, 1953; *Animoceradocus* G. Karaman, 1984; *Austromaera* Lowry & Springthorpe, 2005; *Bathyceradocus* Pirlot, 1934; *Beaudettia* J.L. Barnard, 1965; *Ceradocoides* Nicholls, 1938; *Ceradocopsis* Schellenberg, 1926; *Ceradocus* Costa, 1853; *Ceradomaera* Ledoyer, 1973; *Coxomaerella* G. Karaman, 1981; *Dumosus* Thomas & Barnard, 1985b; *Elasmopoides* Stebbing, 1908; *Elasmopus* Costa, 1853; *Glossomaera* Krapp-Schickel, 2009; *Hamimaera* Krapp-Schickel, 2008a; *Hoho* Lowry & Fenwick, 1983; *Ifalukia* J.L. Barnard, 1972a; *Jerbarnia* Croker, 1971; *Linguimaera* Pirlot, 1936; *Lupimaera* Barnard & Karaman, 1982; *Maera* Leach, 1814; *Maeracoota* Myers, 1997; *Maeropsis* Chevreux, 1919; *Mallacoota* J.L. Barnard, 1972a; *Megaceradocus* Mukai, 1979; *Metaceradocoides* Birstein & Vinogradov, 1960; *Meximaera* Ledoyer, 1983; *Othomaera* Krapp-Schickel, 2000; *Paraceradocus* Stebbing, 1899; *Parelasmpopus* Stebbing, 1888; *Pseudelasmpopus* Ledoyer, 1978; *Quadrimaera* Krapp-Schickel & Ruffo, 2000; *Quadrivisio* Stebbing, 1907; *Ruffomaera* Krapp-Schickel, 2008b; *Saurodocus* Yerman & Krapp-Schickel, 2008; *Spathiopus* Thomas & Barnard, 1985a; *Thalassostygus* Vonk, 1990; *Wimvadocus* Krapp-Schickel & Jarrett, 2000; *Zygomaera* Krapp-Schickel, 2000.

**Remarks.** Now that the Maeridae Krapp-Schickel, 2008a is recognised as distinct from the Melitidae Bousfield, 1973, it becomes apparent how morphologically similar the genera of Maeridae are to those of the freshwater family Hadziidae S. Karman, 1943. Although hadziids generally have differently shaped gnathopods, third uropods and telsons from maerids, the only character we can currently find to separate the two families definitively, is the stalked gills (with partial or complete proximal diarsis) of the Hadziidae. Most genera fit well within the definition of the Maeridae. Barnard & Barnard (1983) listed *Parapherusa* in their ‘ceradocid’ group. We exclude it from the Maeridae because the second antennae are slightly longer than the first, the anteroventral corner of the head is rounded and entire, the first gnathopods are apparently sexually dimorphic and the peduncle of uropod 1 has a distoventral spine and does not have a basofacial robust seta. Until there is a phylogeny which takes into account all of the ‘hadzioid’ taxa the family level structure will remain problematic.

## The *Elasmopus* group

The *Elasmopus* group was originally proposed by J.L. Barnard (1972a: 239) within the family Gammaridae. He included four genera: *Elasmopus* Costa, 1853, *Ifalukia* J.L. Barnard, 1972a, *Mallacoota* J.L. Barnard, 1972a and *Parelasmpopus* Stebbing, 1888. Later Lowry & Fenwick (1983) included a fifth genus, *Hoho*. In this paper we include two additional genera, the enigmatic *Beaudettia* J.L. Barnard, 1965, originally placed in its own family, but later placed in the ‘ceradocid’ group of Barnard & Barnard (1983), and *Spathiopus* Thomas & Barnard, 1985a.

The expanded *Elasmopus* group is characterised by well developed eyes, a cheek notch/slit on the side of the head and a rounded or subacute anteroventral corner, a short to minute accessory flagellum, a distomedial flap on the third article of the maxillipedal palp, an anteroventrally produced coxa 1, pleonites and urosomites without dorsally serrate posterodistal margins and a third uropod with well developed rami which are never more than twice the length of the peduncle.

Other characters which appear in some taxa within the *Elasmopus* group genera include: pairs of dorsal carinae on pereonite 7 to urosomite 1 (*Parelasmpus*, *Mallacoota*); a pair of dorsal carinae on the first urosomite only (*Mallacoota*, *Hoho*); a 1-articulate mandibular palp (*Hoho*, *Ifalukia*) and a falcate mandibular palp (*Elasmopus*, *Spathiopus*). In particular, the 1-articulate mandibular palp separates *Hoho* from *Mallacoota* and *Ifalukia* from *Elasmopus*. The falcate mandibular palp separates *Elasmopus* and *Spathiopus* from all other taxa. The bicarinate urosomite 1 separates *Hoho*, *Mallacoota* and *Parelasmpus* from *Beaudettia*, *Elasmopus*, *Ifalukia* and *Spathiopus*. In four Indo-West Pacific species of *Elasmopus* (*E. integer* Myers, 1989, *E. pseudinteger* Appadoo & Myers, 2003, *E. takamotus* Myers, 1986a and *E. visakhapatnamensis* Kanakadurga, Rao & Shyamasundari, 1982) the telson is entire. *Beaudettia palmeri* J.L. Barnard, 1965, also has an entire telson. In two species (*Elasmopus neglectus* Chilton, 1915 and *E. japonicus* Stephensen, 1932) there is a single carina on urosomite 1. Therefore it appears that within the *Elasmopus* group there is the potential for re-evaluation of current generic divisions based on at least the morphological structures mentioned above.

Considering the three *Elasmopus* group genera which occur on the Great Barrier Reef: *Elasmopus* is widespread and speciose in tropical and temperate environments worldwide; *Mallacoota* occurs throughout the Indo-West Pacific and in the Caribbean area and *Parelasmpus* is a small genus, endemic to the Indo-West Pacific. The remaining, non-GBR genera are smaller with more restricted distributions. *Beaudettia* and *Ifalukia* are both monotypic genera, apparently endemic to Micronesia and *Spathiopus* is endemic to the Caribbean area. *Hoho* is confined to southern Australia and southern New Zealand.

Berents (1983) reported eight species from Lizard Island, five species of *Elasmopus*, one species of *Mallacoota* and two species of *Parelasmpus*. We report 15 species, including two new species of *Elasmopus* – one originally identified as *E. pocillimanus* Bate (1862) by Berents (1983), five additional species of *Mallacoota* and two species of *Parelasmpus* – one of which was originally identified by Berents (1983) as *P. echo* J.L. Barnard (1972a).

Two species of *Elasmopus* are apparently endemic to the tropical Australia (*E. spinicarpus* Berents, 1983 and *E. varanocephalensis* **sp. nov.**), and five species are widespread in the Indo-West Pacific (*E. alalo* Myers, 1986b, *E. crenulatus* Berents, 1983, *E. hooheno* J.L. Barnard, 1970, *E. pecteniscrus* (Bate, 1852); *E. slatyeri* **sp. nov.**). Three species of *Mallacoota* are apparently endemic to tropical Australia (*M. balara* Berents, 1983, *M. chandaniae* Lowry & Springthorpe, 2005 and *M. scopulosa* **sp. nov.**) and three species occur elsewhere in the Indo-West Pacific (*M. capricornia* **sp. nov.**, *M. nananui* Myers, 1985, *M. schellenbergi* Ledoyer, 1984). Both species of *Parelasmpus* are apparently endemic to tropical Australia (*P. cymatilis* **sp. nov.**, *P. suensis* (Haswell, 1879b)).

The *Elasmopus* group is relatively well known in tropical (15 species) and temperate (18 species) Australia (current study; J.L. Barnard 1972a; Lowry & Springthorpe 2005). At present there appears to be no species overlap between these areas within Australia.

### *Elasmopus* Costa, 1853

**Remarks.** *Elasmopus* is a large genus of 89 species. Including the new species described here *Elasmopus* contains 50 species in the Indo-West Pacific, 13 of which are known from Australian waters. The main characters to distinguish species of *Elasmopus* are the shape of the falcate mandibular palp, the palm of male gnathopod 2, the posteroventral corner of epimeron 3 and the lateral and apical margins of the telson.

***Elasmopus alalo* Myers, 1986**

(Figs 1, 2)

*Elasmopus pseudaffinis*. —J.L. Barnard, 1965: 501, figs 12, 13. —Ledoyer, 1972: 219, pls 38, 39. —Ledoyer, 1978: 273, fig. 20a (in part). —Berents, 1983: 118, figs 15, 16. —Ledoyer, 1984: 65, fig. 30b. —?Ren, 1998, 203: fig. 6.

*Elasmopus alalo* Myers, 1986b: 273, figs 4, 5. —Springthorpe & Lowry, 1994: 8 (catalogue). —Myers, 1995: 27. —Lowry & Stoddart, 2003: 177 (catalogue).

**Material examined.** 1 female, 7.1 mm, AM P30114 (QLD 50); 1 male, 11.5 mm, AM P30115 (QLD 62); 1 unsexed, AM P75706 (QLD 1846); 2 unsexed, AM P75709 (QLD 1849); 1 unsexed, AM P75850 (QLD 1850); 2 unsexed, AM P75710 (QLD 1851); 1 unsexed, AM P75711 (QLD 1854); 2 unsexed, AM P75708 (QLD 1866); many unsexed, AM P75707 (QLD 2001); 2 unsexed, AM P78268 (NT 6); 11 unsexed, AM P78258 (NT 16); 3 unsexed, AM P78259 (NT 17); 4 unsexed, AM P78260 (NT 19); 7 unsexed, AM P78261 (NT 22); 1 unsexed, AM P78263 (NT 36); 5 unsexed, AM P78265 (NT 55); 10+ unsexed, AM P78266 (NT 58); 10+ unsexed, AM P78267 (NT 59); 18 unsexed, AM P78269 (NT 60); 7 unsexed, AM P78270 (NT 78); 10+ unsexed, AM P78271 (NT 79); 1 unsexed, AM P78274 (NT 80); 1 unsexed, AM P78262 (NT 345); 1 male dissected, 4 slides, NTM Cr016750 (MAGNT 31); 2 unsexed, NTM CR015864 (MAGNT 31).

**Type locality.** Utulau, Tongatapu, Tonga (~21°11'24"S 175°16'8.4"W).

**Description.** Based on a male, 11.5 mm, AM P30115.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 slightly shorter than article 2, with 3 robust setae along posterior margin; article 2 longer than article 3; accessory flagellum short, with 4 articles; flagellum with 17 articles. *Antenna 2* peduncular article 4 slightly longer than article 5; flagellum with 7 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 3 setae; palp well developed, 3-articulate; article 1 about twice as long as broad, shorter than article 2, inner margin not produced distally; article 2 shorter than article 3; article 3 long (5 x as long as broad), weakly falcate, longer than article 1.

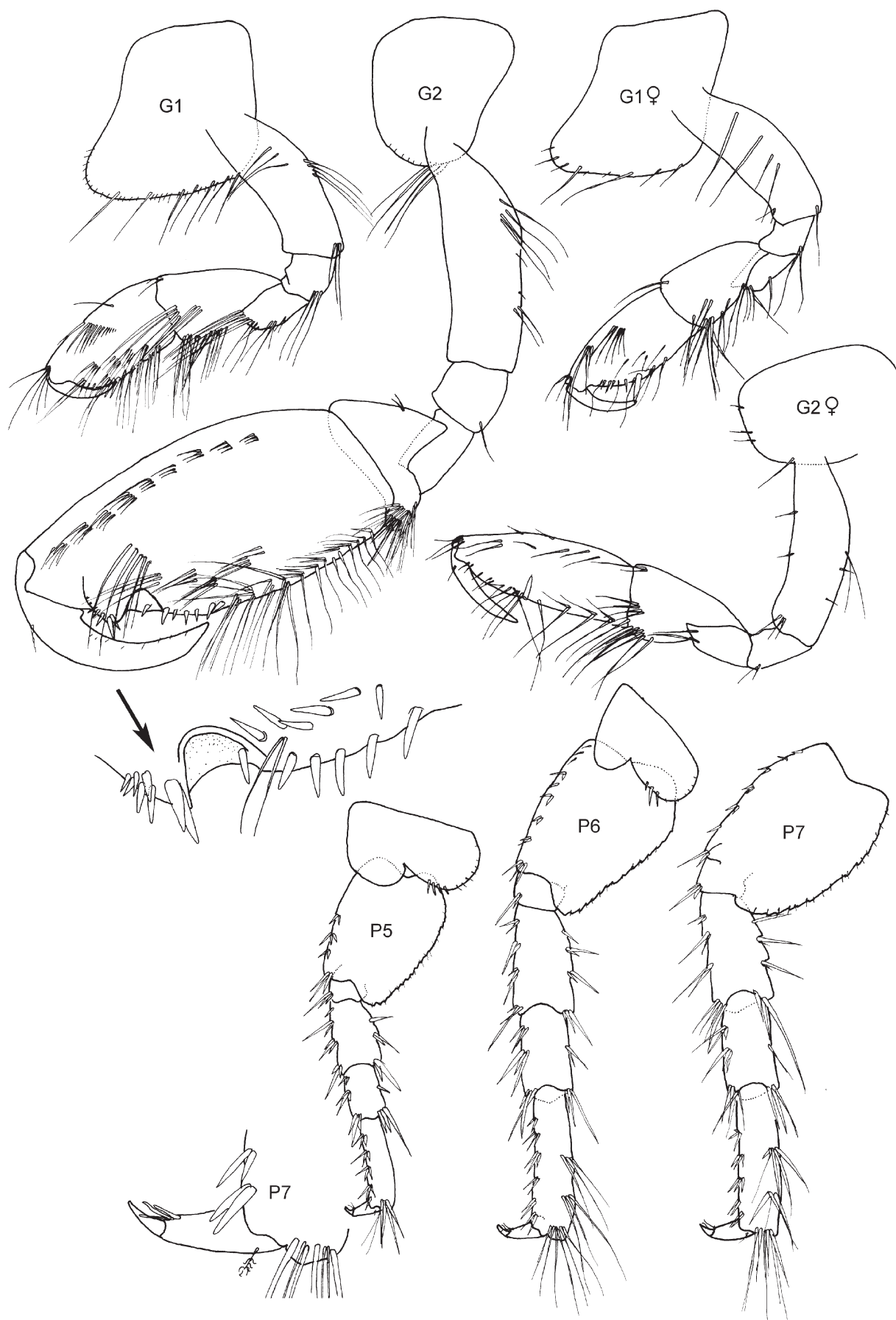
**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, subequal in length to propodus, setae in anterodistal bunches and along posterior margin; propodus palm acute, slightly convex, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; carpus compressed, projecting between merus and propodus, length 1 x breadth; propodus expanded, with slender setae along posterior margin, palm acute, straight, sculptured, palm about half length of propodus, with subtriangular distomedial shelf, with group of 8 robust setae on shelf, with midmedial excavation, margin lined with two rows of 10 robust setae, without teeth along margin, subpalmar surface smooth, without posteroventral corner, with 2 posterodistal robust setae; dactylus reaching end of palm, closing into socket, without setae on anterior margin, without posteroproximal shelf, apically subacute. *Pereopod 4* coxa posteroventral lobe slightly developed, with rounded posteromedial corner. *Pereopod 5* basis proximally expanded, slightly tapering distally, posterior margin straight, without long slender setae, posteroventral corner narrowly rounded; merus and carpus not broadened; carpus and propodus with few long, slender setae along anterior margin. *Pereopod 6* basis posterior margin straight, without long slender setae, posteroventral corner narrowly rounded; merus and carpus not broadened; carpus and propodus with few long, slender setae along anterior margin; propodus expanded posterodistally to form a slight hood-like projection. *Pereopod 7* basis posterior margin convex, minutely castelloserrate, without long slender setae, not produced posterodistally, posteroventral corner broadly rounded; merus and carpus not broadened; propodus expanded posterodistally to form a slight hood-like projection.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner subquadrate. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute spine. *Urosomites 1–3* dorsally smooth, without setae,





**FIGURE 1.** *Elasmopus alalo* Myers 1988, male, 11.5 mm, AM P30115, Lizard Island, Great Barrier Reef.



**FIGURE 2.** *Elasmopus alalo* Myers 1988, male, 11.5 mm, AM P30115, female, 7.1 mm, AM P30114, Lizard Island, Great Barrier Reef.

spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally rounded, apical robust setae long and short; inner ramus subequal in length to outer ramus; inner ramus long (length 2 to 2.5 x breadth); outer ramus long, length 2.9 x breadth, longer than peduncle, 1-articulate. *Telson* deeply cleft (more than 66%), longer than broad, tapering distally, each lobe with long inner and short outer apical cusp, apical conical extension reaching at least halfway along longest seta, without dorsal robust setae, each lobe with 2 short apical robust setae, without robust setae on inner or outer margins.

**Female** (sexually dimorphic characters). Based on female specimen, 7.1 mm, AM P30114. *Gnathopod 2* carpus long, length 2 x breadth, not enclosed by merus and propodus; propodus subrectangular, palm extremely acute without corner, smooth, without shelf, without robust setae, without posteroventral corner.

**Habitat.** Marine, epibenthic.

**Remarks.** Myers (1986b) has established the similarity of *E. alalo* and *E. pseudaffinis*. Among species on the GBR, *Elasmopus alalo* is most similar to *E. varanocephalensis* from which it differs in having a midmedial excavation and two rows of setae along the palm of male gnathopod 2 (no midmedial excavation and one row in *E. varanocephalensis*) and a smooth subpalmar surface (three raised round nodules in *E. varanocephalensis*).

**Distribution.** *Australia*. Queensland: Thursday Island, Torres Strait (current study); Lizard Island (Berents 1983); One Tree Island (current study). Northern Territory: New Year Island; McCluer Island; Oxley Island; Shell Islands (current study). *Madagascar*. Tuléar (Ledoyer 1972). *Mauritius*. (Ledoyer 1978). *Micronesia*. Marshall Islands (J.L. Barnard 1965). *New Caledonia*. I'ilot Maitre (Ledoyer 1984). *South China Sea*: Nansha (or Spratly) Islands (Ren 1998). *Tonga*. Utulau (Myers 1986b).

### ***Elasmopus crenulatus* Berents, 1983**

(Figs 3, 4)

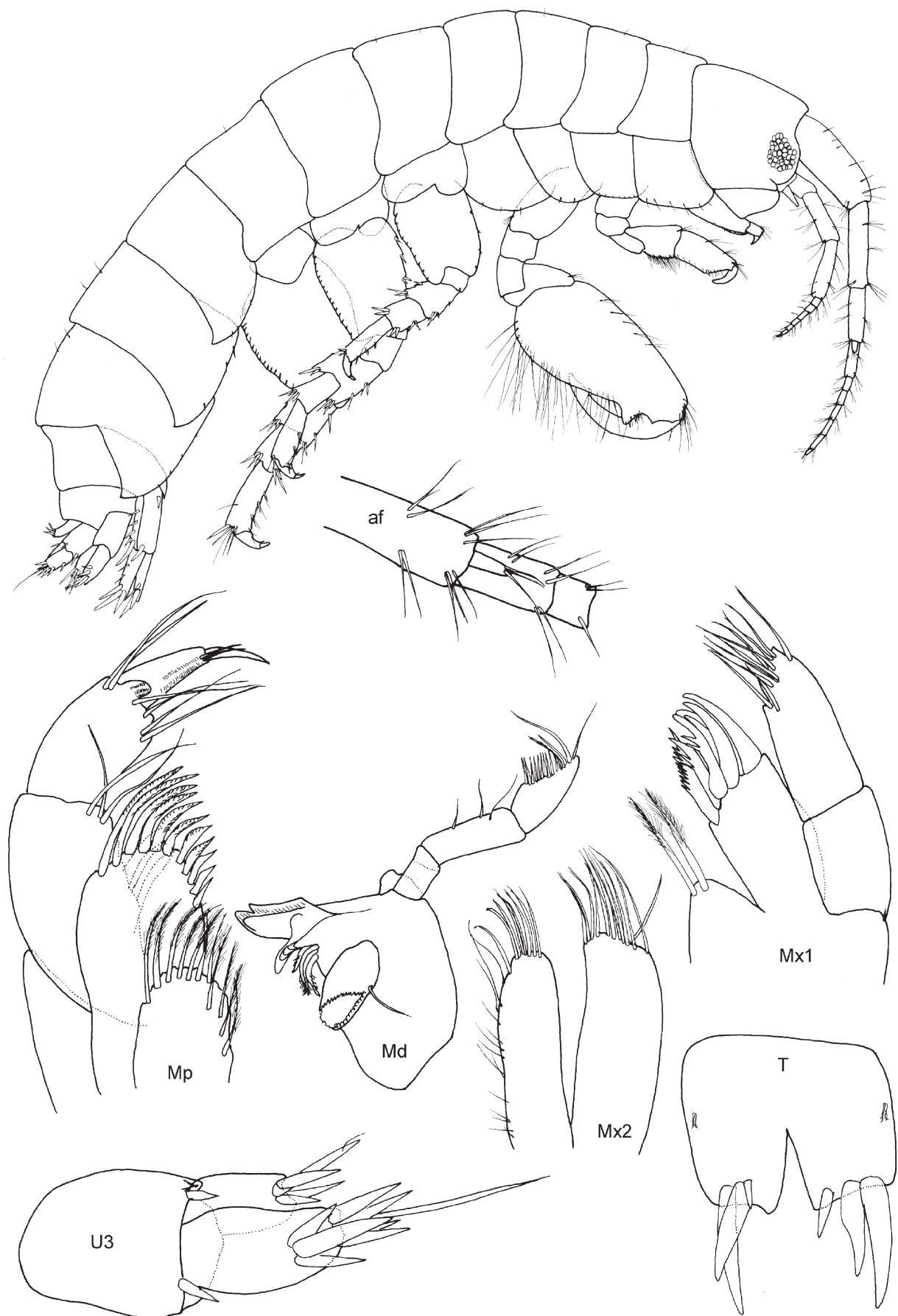
*Elasmopus crenulatus* Berents, 1983: 113, figs 10–12. —Springthorpe & Lowry, 1994: 13 (catalogue). —Lowry & Stoddart, 2003: 178 (catalogue).

**Material examined.** Holotype, male, 3.5 mm, AM P30095 (76 LIZ B 6.18.3); paratype, female, 4.8 mm, AM P30096 (76 LIZ B 6.2); 1 unsexed, AM P70573 (QLD 1618); 2 unsexed, AM P 71604 (QLD 1621); 1 unsexed, AM P70611 (QLD 1621); 10+ unsexed, AM P 70596 (QLD 1622); 6 unsexed AM P70988 (QLD 1649); 1 unsexed, AM P71603 (QLD 1670); 10+ unsexed, AM P70851 (QLD 1689); 6 unsexed, AM P70982 (QLD 1693); 1 male, 4.4 mm, 3 slides, AM P78025 (QLD 1698); 1 male, 4.8 mm, AM P78026 (QLD 1698); 10+ unsexed, AM P70929 (QLD 1698); 1 unsexed, AM P71011 (QLD 1705); 5 unsexed, AM P 71021 (QLD 1709); 7 unsexed, AM P71045 (QLD 1711); 2 unsexed, AM P71040 (QLD 1715); 1 unsexed, AM P71087 (QLD 1716); 10+ unsexed, AM P71181 (QLD 1730); 1 unsexed, AM P71275 (QLD 1770); 10+ unsexed, AM P75712 (QLD 1963); 10+ unsexed, AM P75714 (QLD 1967); 6 unsexed, AM P75713 (QLD 2006); 1 male, NTM Cr016749 (MAGNT 20).

**Type locality.** Off Chinamans Ridge, Watsons Bay, Lizard Island, Queensland, Australia (14°40'S 145°27'E).

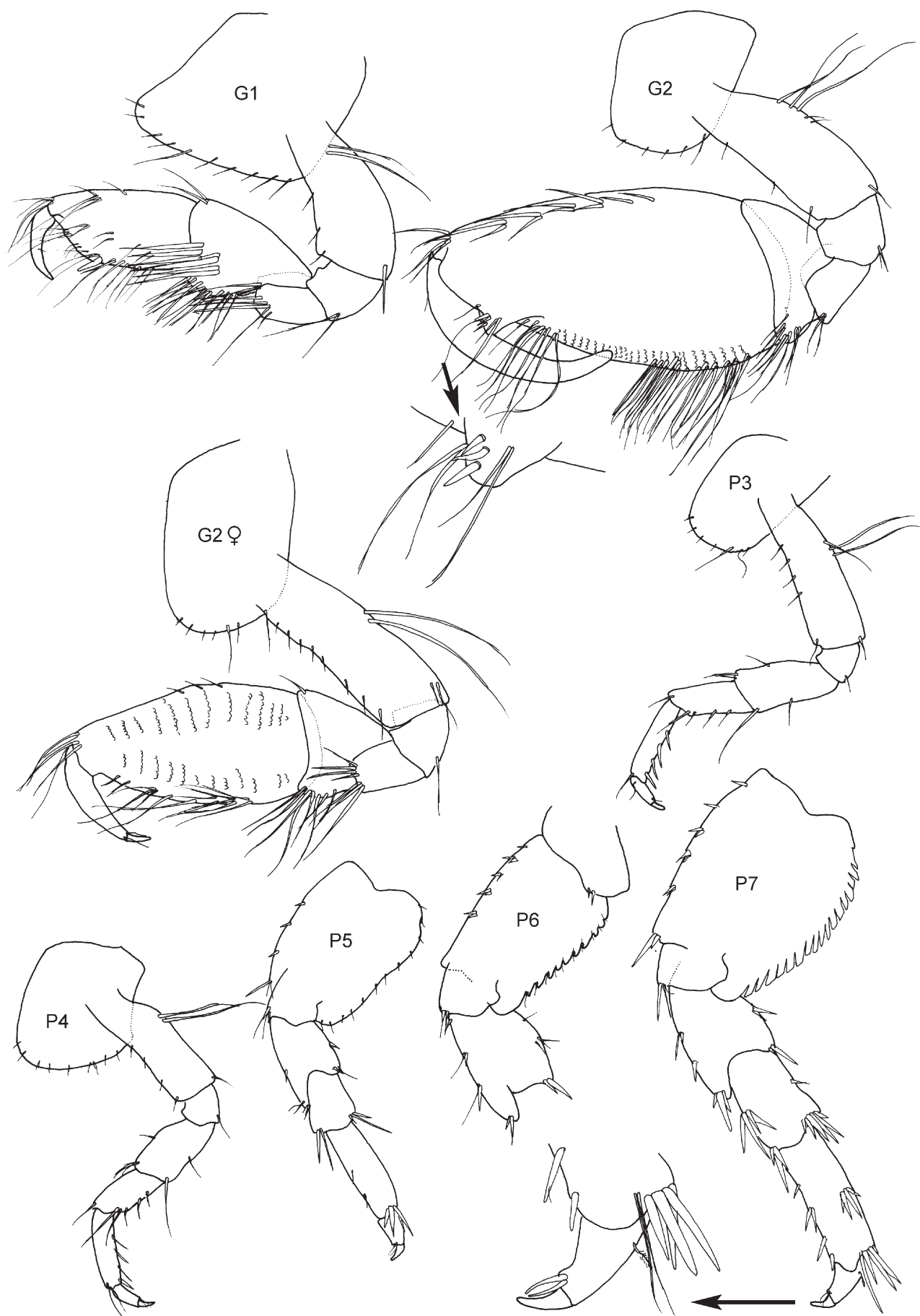
**Description.** Based on holotype male, 3.5 mm, AM P30095 (Berents, 1983).

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, apically rounded, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, with 1 robust seta on posterior margin; accessory flagellum minute, with 1 article; flagellum with 8 articles. *Antenna 2* peduncular article 4 subequal to article 5; flagellum with 6 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 4 setae; palp well developed, 3-articulate; article 1 about twice as long as broad, shorter than article 2, inner margin not produced distally; article 2 subequal to article 3; article 3 short (2.3 x as long as broad), strongly falcate, longer than article 1.



**FIGURE 3.** *Elasmopus crenulatus* Berents 1983, habitus male, 4.4 mm, AM P78025, Lizard Island, parts holotype male, 3.5 mm, AM P30095, Lizard Island, Great Barrier Reef.





**FIGURE 4.** *Elasmopus crenulatus* Berents 1983, Holotype male, 3.5 mm, AM P30095, paratype, female, 4.8 mm, AM P30096, Lizard Island, Great Barrier Reef.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, subequal in length to propodus, setae in anterodistal bunches and along posterior margin; propodus palm acute, straight, entire, defined by posterodistal corner, with posterodistal robust seta. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus with subquadrate distoventral corner; carpus compressed, not enclosed by merus and propodus, length 0.7 x breadth; propodus expanded, with dense slender setae along posterior margin, palm acute, convex, smooth, with subtriangular distomedial shelf, with group of 3 robust setae on shelf, palmar margin without robust setae, without teeth, subpalmar surface smooth, without posteroventral corner, without posterodistal robust setae; dactylus closing along palm, without setae on anterior margin, without posteroproximal shelf, apically subacute. *Pereopod 4* coxa posteroventral lobe absent, posterior margin concave. *Pereopod 5* basis proximally expanded, tapering distally, posterior margin slightly subsigmoidal, without long slender setae, posteroventral corner narrowly rounded or subquadrate; carpus and propodus with few long, slender setae along anterior margin. *Pereopod 6* basis posterior margin straight, without long slender setae, posteroventral corner narrowly rounded; carpus and propodus without long, slender setae along anterior margin; merus and carpus broadened; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin convex, castelloserrate, without long slender setae, not produced posterodistally, posteroventral corner narrowly rounded; merus and carpus broadened; propodus not expanded posterodistally.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner with small acute spine. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute spine. *Urosomites 1–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long; inner ramus slightly shorter than outer ramus; inner ramus short (length 1.7 x breadth); outer ramus short, shorter than peduncle, 1-articulate. *Telson* moderately cleft (30 to 65%), broader than long, short, lobes apically truncated, without apical conical extensions, without dorsal robust setae, each lobe with 3 long and short apical robust setae, without robust setae on inner and outer margins.

**Female** (sexually dimorphic characters). Based on paratype, female, 4.8 mm, AM P30096. *Gnathopod 2* carpus long, length 2 x breadth, not enclosed by merus and propodus; propodus subrectangular, palm extremely acute without corner, smooth, without shelf, without robust setae.

**Habitat.** Marine, epibenthic, living on reef rock, dead coral and encrusting algae in 4 to 7 m depth.

**Remarks.** This is the first record of *E. crenulatus* since the original description by Berents (1983). It is most probably the sister species of *E. arrawarra* Hughes & Lowry (2006) from the Solitary Islands. *Elasmopus crenulatus* and *E. arrawarra* have a disjunct distribution along the east coast of Australia. Both species have shortened first and second antennae, a short article 3 on the mandibular palp, a short inner ramus on uropod 3 and an almost subquadrate telson with strong apical robust setae.

*Elasmopus crenulatus* can be distinguished from other species on the GBR by the basis of pereopod 7 with its strongly crenulate posterior margin, by the short inner ramus on uropod 3 and the short, almost subquadrate telson with strong, apical robust setae.

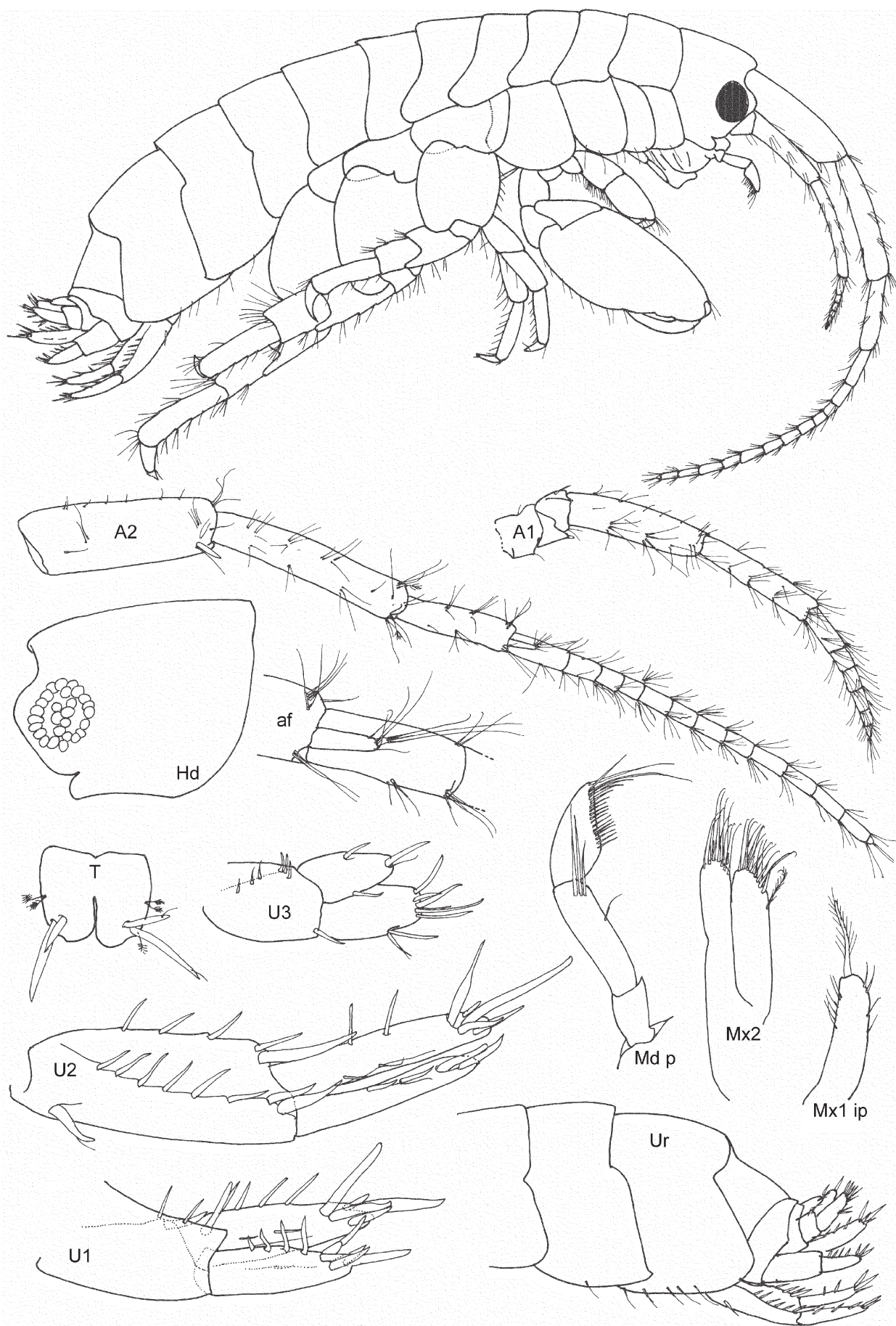
**Distribution.** *Australia.* Queensland: Lizard Island (Berents 1983; current study); One Tree Island (current study). Northern Territory: Darwin (current study). *Indian Ocean.* Cocos (Keeling) Islands (Berents 1983).

### ***Elasmopus hooheno* J.L. Barnard, 1970** (Figs 5, 6)

*Elasmopus hooheno* J.L. Barnard, 1970: 121, fig. 70. —J.L. Barnard, 1971: 71, figs 33–35. —Ledoyer, 1972: 217, pls 35, 36. —Ledoyer, 1978: 269. —Ledoyer, 1979a: 161, fig. 10 II. —Ledoyer, 1979b: 69, fig. 40 I. —Ledoyer, 1983: 470, fig. 177. —Berents, 1983: 116, fig. 13. —Ren, 1998: 197, fig. 3. —Lowry & Stoddart, 2003: 178 (catalogue).

*Elasmopus rapax.* —Sivaprakasam, 1969: 45, fig. 6A.

Not *Elasmopus hooheno*. —Appadoo & Steele, 1998: 639 (= *E. pseudinteger* Appadoo & Myers, 2003).



**FIGURE 5.** *Elasmopus hooheno* Barnard 1972, male, 6.3 mm, AM P30107, Lizard Island, Great Barrier Reef.

**Material examined.** 1 male, 6.3 mm, 3 slides AM P78771 (76 LIZ 16B); 4 unsexed, AM P71466 (QLD 1789); 1 female, 4.0 mm AM P78772 (76 LIZ B); 66 unsexed, AM P30107; 2 unsexed, AM P75720 (QLD 1877); 3 unsexed, AM P75716 (QLD 1947); 1 unsexed, AM P75719 (QLD 1972); 2 unsexed, AM P75718 (QLD 1978); 9 unsexed, AM P75717 (QLD 2006).

**Type locality.** Kawela Bay, Oahu, Hawaiian Island (~21°42'10"N 158°0'40"W).

**Description.** Based on male, 6.3 mm, AM P30107 (Berents, 1983).

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, with 1 robust seta on posterior margin; article 2 longer than article 3; accessory flagellum minute, with 2 articles; flagellum with 13 articles. *Antenna 2* peduncular article 4 subequal to article 5; flagellum with 6 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; palp well developed, 3-articulate; article 1 about as long as broad, shorter than article 2, inner margin weakly produced distally; article 2 longer than article 3; article 3 short (2 x as long as broad), strongly falcate, longer than article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner slightly produced, rounded, anterior margin straight; merus without posterodistal tooth; carpus about 2 x as long as broad, shorter than propodus, with setae in anterodistal bunches and along posterior margin; propodus palm acute, straight, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus acutely produced distoventrally; carpus compressed, not enclosed by merus and propodus, length 0.75 x breadth; propodus expanded, with slender setae along posterior margin, palm acute, sculptured, about one third length of propodus, with rounded distomedial shelf, with group of 4 robust setae on shelf, with midmedial excavation, palmar margin without robust setae, with 1 subacute or truncate tooth, subpalmar surface smooth, corner defined by posteroventral tooth, without posterodistal robust setae; dactylus reaching end of palm, closing into socket, with 1 seta on anterior margin, without posteroproximal shelf, apically blunt. *Pereopod 4* coxa posteroventral lobe slightly developed, with rounded posteromedial corner. *Pereopod 5* basis expanded, posterior margin straight, with long slender setae, posteroventral corner broadly rounded; carpus and propodus with few long, slender setae along anterior margin. *Pereopod 6* basis posterior margin straight, with long slender setae, posteroventral corner broadly rounded; merus and carpus broadened; carpus and propodus with few long, slender setae along anterior margin; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin convex, smooth, with long slender setae, not produced posterodistally, posteroventral corner broadly rounded; merus and carpus broadened; propodus not expanded posterodistally.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner broadly rounded. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner narrowly rounded. *Urosomites 1–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae short and long; inner ramus shorter than outer ramus; inner ramus short (length 1.9 x breadth); outer ramus short, subequal to peduncle, 1-articulate. *Telson* moderately cleft (30 to 65%), broader than long, short, lobes apically truncated, apical conical extension absent, without dorsal robust setae, each lobe with 2 short and long apical/subapical robust setae, without robust setae on inner and outer margins.

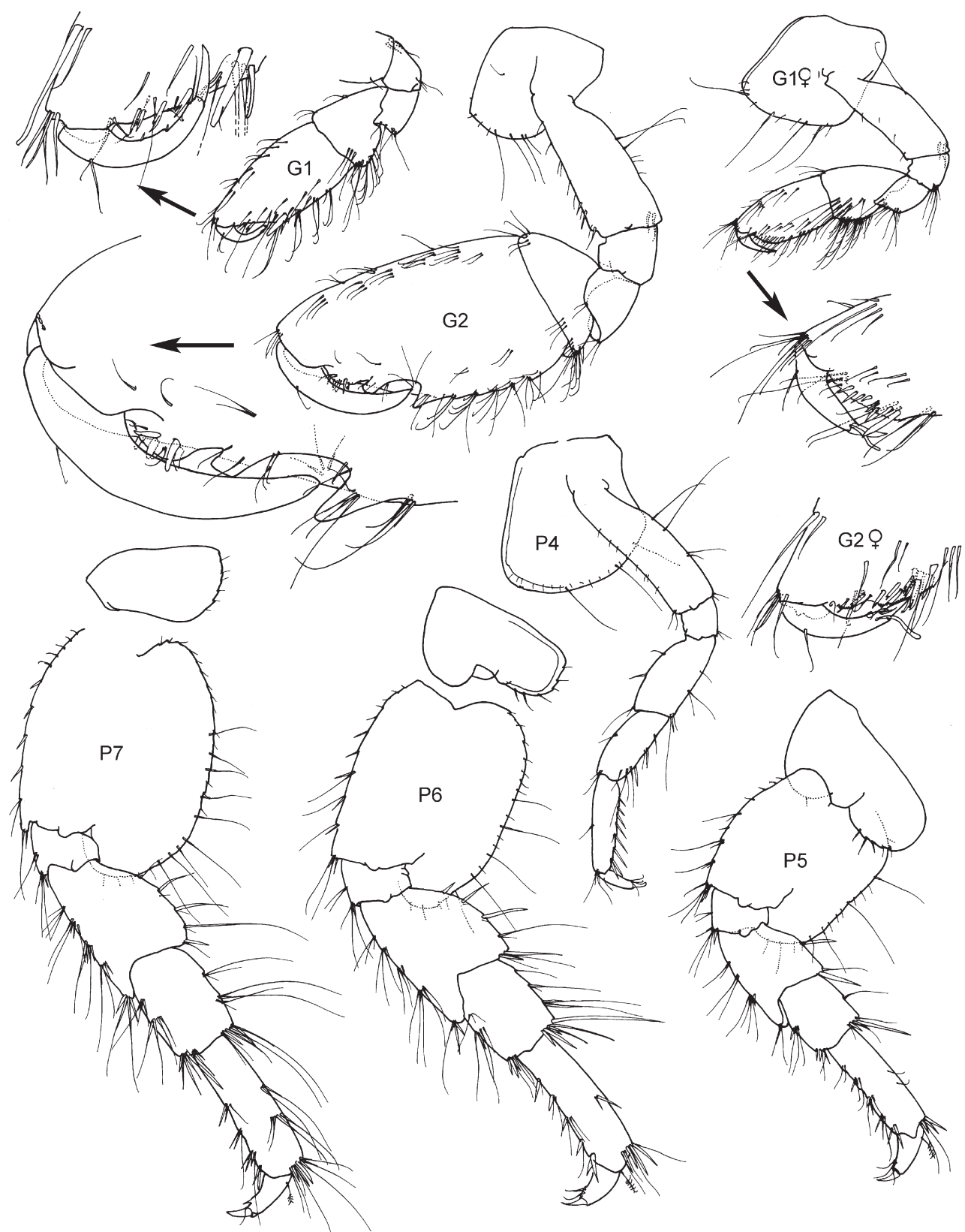
**Female** (sexually dimorphic characters). Based on female, 4.0 mm, AM P78772. *Gnathopod 2* not enclosed by merus and propodus; propodus subrectangular, straight, smooth, without shelf, with sparse robust setae, without teeth along margin, without posteroventral corner, with posterodistal robust setae; apically subacute.

**Habitat.** Marine, epibenthic, among *Sargassum*, other algae, rocks and coral rubble and reef rock, intertidal and subtidal.

**Remarks.** *Elasmopus hooheno* is a widespread Indo-West Pacific species which ranges from Madagascar in the western Indian Ocean to Hawaii in the north-central Pacific Ocean. The GBR population differs from other populations in having a moderately cleft telson (deeply cleft in the Hawaiian population). In the original description J.L. Barnard (1970) described the mandibular palp as “normally falcate”. The third article of the



palp illustrated for the Madagascar population by Ledoyer (1983) is long and weakly falcate, whereas in the GBR population it is short and strongly falcate.



**FIGURE 6.** *Elasmopus hooheno* Barnard 1972, male, 6.3 mm, AM P30107; female 4.0 mm AM P78772, Lizard Island, Great Barrier Reef.



*Elasmopus hooheno* and *E. crenulatus* are the only *Elasmopus* species on the GBR with a shortened inner ramus on uropod 3. *Elasmopus hooheno* differs from *E. crenulatus* by the sculptured palm on the male second gnathopod (smooth in *E. crenulatus*) and smooth posterior margins on the basis of pereopods 6 and 7 (castelloserrate in *E. crenulatus*).

**Distribution.** *Australia.* Queensland: Thursday Island, Torres Strait (current study); Lizard Island (Berents 1983); One Tree Island (current study). Western Australia: Direction Island and Prison Island, Cocos (Keeling) Islands, Indian Ocean (Berents 1983). *India.* Kilakkarai, Gulf of Mannar (Sivaprakasam 1969). *Indonesia.* Marsegu Island, Moluccas (Ledoyer 1979a). *Madagascar.* Tuléar (Ledoyer, 1972, 1979b). *Mauritius.* (Ledoyer, 1978). *South China Sea.* Nansha (or Spratly) Islands (Ren 1998). *USA.* Oahu, Hawaiian Islands (J.L. Barnard 1970).

### ***Elasmopus pectenircus* (Bate, 1862)**

(Figs 7, 8)

*Moera pectenircus* Bate, 1862: 192, pl. 34, fig. 8.

*Elasmopus pectenircus.* —K.H. Barnard, 1916: 197, pl. 28, fig. 33. —Schellenberg, 1928: 647. —?Shoemaker, 1935: 238. —Pirlot, 1936: 312. —Schellenberg, 1936: 13. —K.H. Barnard, 1937: 161. —Schellenberg, 1938: 55. —Ruffo, 1938: 162. —K.H. Barnard, 1940: 461. —Rudwick, 1951: 149, 152. —Reid, 1951: 236, fig. 32. —J.L. Barnard, 1955: 8, fig. 4. —Ruffo, 1959: 21. —Nayar, 1959: 27, pl. 9, figs 20–35. —Sivaprakasam, 1968: 103. —Sivaprakasam, 1969: 45, fig. 6b–c. —Ruffo, 1969: 28. —J.L. Barnard, 1970: 125: figs 73–74. —Griffiths, 1974a: 235. —Griffiths, 1974b: 289. —Griffiths, 1975: 121. —G. Karaman, 1982: 286, fig. 192. —Ledoyer, 1983: 475, figs 179, 180. —Soares *et al.*, 1987/89: 241, pl. 2, figs 1–12. —Wakabara *et al.*, 1991: 73. —Wakabara & Serejo, 1998: 575. —Appadoo & Steele, 1998: 639. —LeCroy, 2000: 88, fig. 129. —Appadoo & Myers, 2003: 65, fig. 4.

*Elasmopus serrula.* —Walker, 1904 : 277, pl. 8, fig. 37. —Walker, 1909: 336.

*Elasmopus pectenircus.* —Gravely, 1927: 123.

? *Elasmopus brasiliensis.* —Oliveira, 1951: 4, pls 1–4.

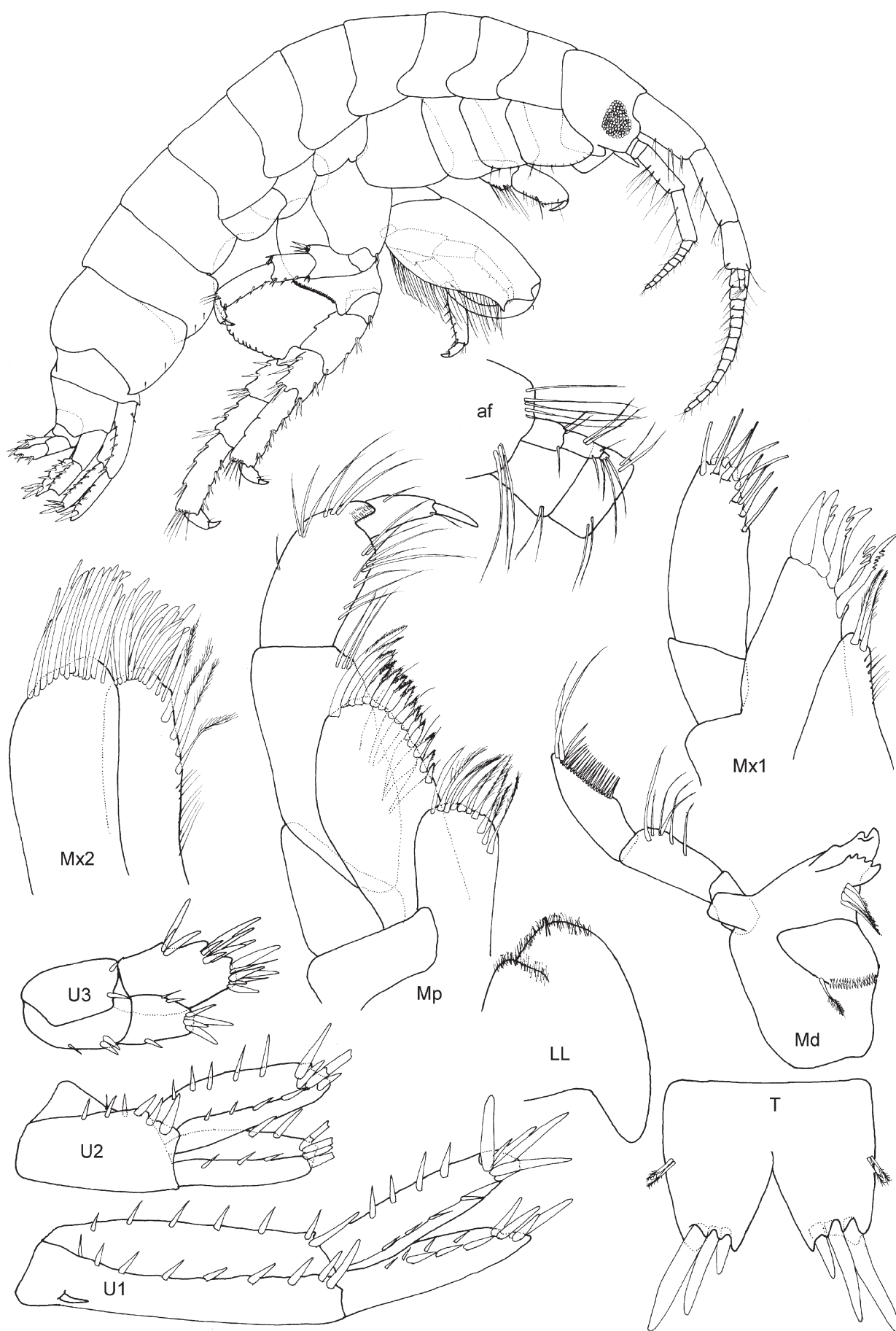
**Material examined.** Male, 7.0 mm (4 slides), AM P78549 (JML 84/4/11/4/N); 10+ unsexed, NTM Cr015421 (MAGNT 26); 8 unsexed, NTM Cr015429 (MAGNT 27); 13 unsexed, NTM Cr015447 (MAGNT 28); 10+ unsexed, NTM Cr015463 (MAGNT 30); 1 unsexed, NTM Cr015784.

**Type locality.** New Guinea.

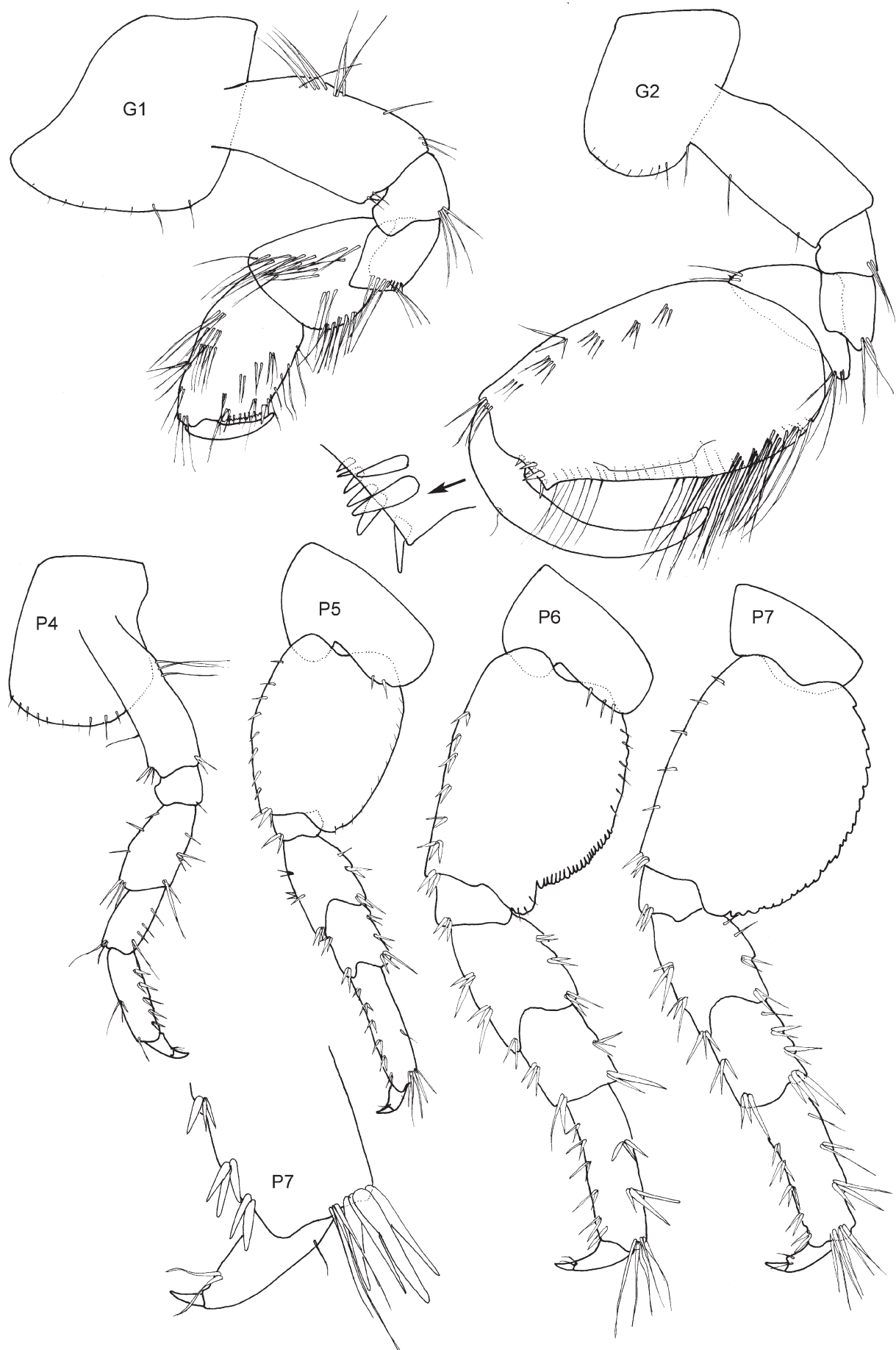
**Description.** Based on a male, 7.0 mm, AM P78549.

**Head.** *Head* eyes subovate; lateral cephalic lobe broad, apically truncate, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, with 1 robust seta on posterodistal margin; article 2 longer than article 3; accessory flagellum short, with 3 articles; flagellum with 14 articles. *Antenna 2* peduncular article 4 subequal to article 5; flagellum with 9 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 3 setae; palp well developed, 3-articulate; article 1 about twice as long as broad, shorter than article 2, inner margin article 1 not produced distally; article 2 slightly shorter than article 3; article 3 short (2.7 x as long as broad), strongly falcate, longer than article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin slightly concave; carpus about 2 x as long as broad, subequal in length to propodus, (length 1 x propodus); propodus palm acute, straight, entire, defined by posterodistal corner, with posterodistal robust seta. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus with rounded distoventral corner; carpus compressed, projecting between merus and propodus; propodus expanded, with slender setae along posterior margin, palm acute, straight, smooth, palm about half length of propodus, with subtriangular distomedial shelf, with group of 7 robust setae on shelf, palmar margin without robust setae, without teeth, subpalmar surface with long seam, without posteroventral corner, without posterodistal robust setae; dactylus reaching end of palm, closing along margin of palm, without setae on anterior margin, without posteroproximal shelf, apically subacute. *Pereopod 4* coxa posteroventral lobe slightly developed, with rounded posteromedial corner.



**FIGURE 7.** *Elasmopus pecteniscus* (Bate, 1852), male, 7.0 mm, AM P78549, Lizard Island, Great Barrier Reef.



**FIGURE 8.** *Elasmopus pecteniscus* (Bate, 1852), male, 7.0 mm, AM P78549, Lizard Island, Great Barrier Reef.

*Pereopod 5* basis expanded; posterior margin slightly convex, without long slender setae, posteroventral corner subquadrate; carpus and propodus without long, slender setae along anterior margin. *Pereopod 6* basis posterior margin convex proximally, castelloserrate, excavate distally, without long slender setae, posteroventral corner produced distally, lobate; merus and carpus broadened; carpus and propodus without long, slender setae along margins; propodus slightly expanded posterodistally to form a hood-like projection. *Pereopod 7* basis posterior margin convex, castelloserrate, without long slender setae, produced posterodistally, posteroventral corner subquadrate; merus and carpus not broadened; propodus slightly expanded posterodistally to form a hood-like projection.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner subquadrate. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute spine. *Urosomites 1–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long and short; inner ramus short, about 0.5 x outer ramus; inner ramus short (length 1 to 1.9 x breadth); outer ramus short (length 1.8 x breadth), subequal in length to peduncle, 1-articulate. *Telson* moderately cleft (30 to 65%), broader than long, short, truncated distally, apical margins concave, without dorsal robust setae, each lobe with 3 apical/subapical robust setae, without robust setae on inner and outer margins.

**Habitat.** Marine, epibenthic hard substrates, occasionally found on the carapace of the loggerhead sea turtle, *Caretta caretta* (LeCroy 2000).

**Remarks.** Although the original description of *E. pecteniscrus* (Bate, 1862: 192, pl. 34, fig. 8) is poor and the type locality, New Guinea, is vague, the illustration of the distinctive basis of pereopod 6 has been widely used to identify the species across the Indo-West Pacific, the Red Sea and even the eastern Atlantic and Caribbean, often with few (K.H. Barnard 1916; Reid 1951) or no illustrations (Schellenberg 1928, 1936, 1938; Pirlot 1936; K.H. Barnard 1937; Ruffo 1938, 1959, 1969; Sivaprakasam 1968; Griffiths 1974a, b, 1975). Comparing recent redescrptions of the species (Ledoyer 1983 from Madagascar and Appadoo & Myers 2003 from Mauritius) with the current redescription from the GBR indicates significant morphological differences between populations (table 1). It is possible that rather than being a widespread ‘superspecies’, *E. pecteniscrus* is actually a group of cryptic species ranging throughout the tropics. Because the type locality is vague and the type material is lost, pinning down the actual morpho-type is impossible, but the material described in this paper from the GBR is geographically the closest. A neotype needs to be established based on material from New Guinea.

*Elasmopus pecteniscrus* is distinguished from other species on the GBR by the distinctive shape of the pereopod 6 basis.

**Distribution.** *Australia.* Queensland: Thursday Island, Torres Strait (current study); Lizard Island (current study). Northern territory: Groote Eylandt; Raffles Bay, Cobourg Peninsula (current study). *Brazil.* Rio de Janeiro (Oliveira, 1951). *Egypt.* Suez (Walker 1909); Port Said (Schellenberg 1928). *India.* Madras (Nayar 1959; Sivaprakasam 1968); Cape Comorin, Tuticorin, Kilakkarai, Ramswaram, Pamban, Calimere, Kovelong, Madras Harbour, Visakhapatnam Harbour (Sivaprakasam 1968); Gulf of Manaar (Sivaprakasam 1969). *Indonesia.* Sangeang Island, Flores Sea (Pirlot 1936). *Israel.* (Ruffo 1959). ? *Madagascar.* (Ledoyer 1983). *Mauritius.* (Appadoo & Myers 2003). *Papua New Guinea.* (Bate 1862); Ralum, Bismarck Archipelago (Schellenberg 1938). *South Africa.* Buffels Bay (False Bay) and Durban (K.H. Barnard 1916); Still Bay and East London (K.H. Barnard 1940). *Sri Lanka.* Galle (Walker 1904). *Tanzania.* Zanzibar (Walker 1909). *USA.* Puerto Rico (Shoemaker, 1935); Pearl Harbor, Hawaii (J.L. Barnard, 1955, 1970); South Florida, Florida Keys and the Dry Tortugas (LeCroy 2000).

### *Elasmopus slatyeri* sp. nov.

(Figs 9, 10)

*Elasmopus pocillimanus.* —J.L. Barnard, 1970: 130, figs 77, 78. —J.L. Barnard, 1971: 71, 75, figs 34, 35. —Ledoyer, 1972: 217, pl. 37. —Ledoyer, 1973: 52, 91. —Ledoyer, 1979b: 73. —Ledoyer, 1983: 478, fig. 180b. —Berents,



1983: 117, fig. 14. —Barnard & Barnard, 1983: 629 (in part). —Ren, 1998: 201, fig. 5. —Lowry & Stoddart, 2003: 178 (catalogue).

**Type material.** Holotype male, 4.9 mm, AM P30113, off western side of Palfrey Island, Lizard Island (14°40'S 145°28'E), reef rock, P.B. Weate & P.A. Hutchings, 12 January 1976 (76 LIZ 16B). Paratypes: 1 unsexed, AM P30111 (75 LIZ T-1); 1 male, 6.0 mm, AM P30112 (75 LIZ V-3).

**Type locality.** Off western side of Palfrey Island, Lizard Island, Queensland, Australia (14°40'S 145°28'E).

**Etymology.** This species is named for *Cameron Slatyer* who supported the Great Barrier Reef Amphipod Project from its inception and provided essential financial assistance for the Lizard Island Amphipod Workshop.

**Description.** Based on holotype, male, 4.9 mm, AM P30113.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, rounded, apically truncate, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, without robust setae along posterior margin; accessory flagellum minute, with 3 articles (third tiny); flagellum with 5–6 articles. *Antenna 2* peduncular article 4 longer than article 5; flagellum with 19 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 3 setae; palp well developed, 3-articulate; article 1 about as long as broad, shorter than article 2, inner margin not produced distally; article 2 subequal to article 3; article 3 short (2.7 x as long as broad) strongly falcate, longer than article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad; propodus palm acute, convex, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus acutely produced distoventrally; carpus compressed, not enclosed by merus and propodus, length 0.67 x breadth; propodus expanded, with slender setae along posterior margin, palm acute, convex, smooth, palm about half length of propodus, without distomedial shelf, with group of 7 robust setae in shelf area, palmar margin without robust setae, without teeth, with long subpalmar seam, without posteroventral corner, without posterodistal robust setae; dactylus reaching end of palm, closing across medial surface of propodus, with 1 seta on anterior margin, with posteroproximal shelf, apically subacute. *Pereopod 5* basis posterior margin slightly convex, without long slender setae, posteroventral corner broadly rounded; carpus and propodus without long, slender setae along anterior margin. *Pereopod 6* basis posterior margin slightly convex, without long slender setae, posteroventral corner broadly rounded; merus and carpus not broadened; carpus and propodus without long, slender setae along anterior margin; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin slightly convex, smooth, without long slender setae, posteroventral corner broadly rounded; merus and carpus not broadened; propodus not expanded posterodistally.

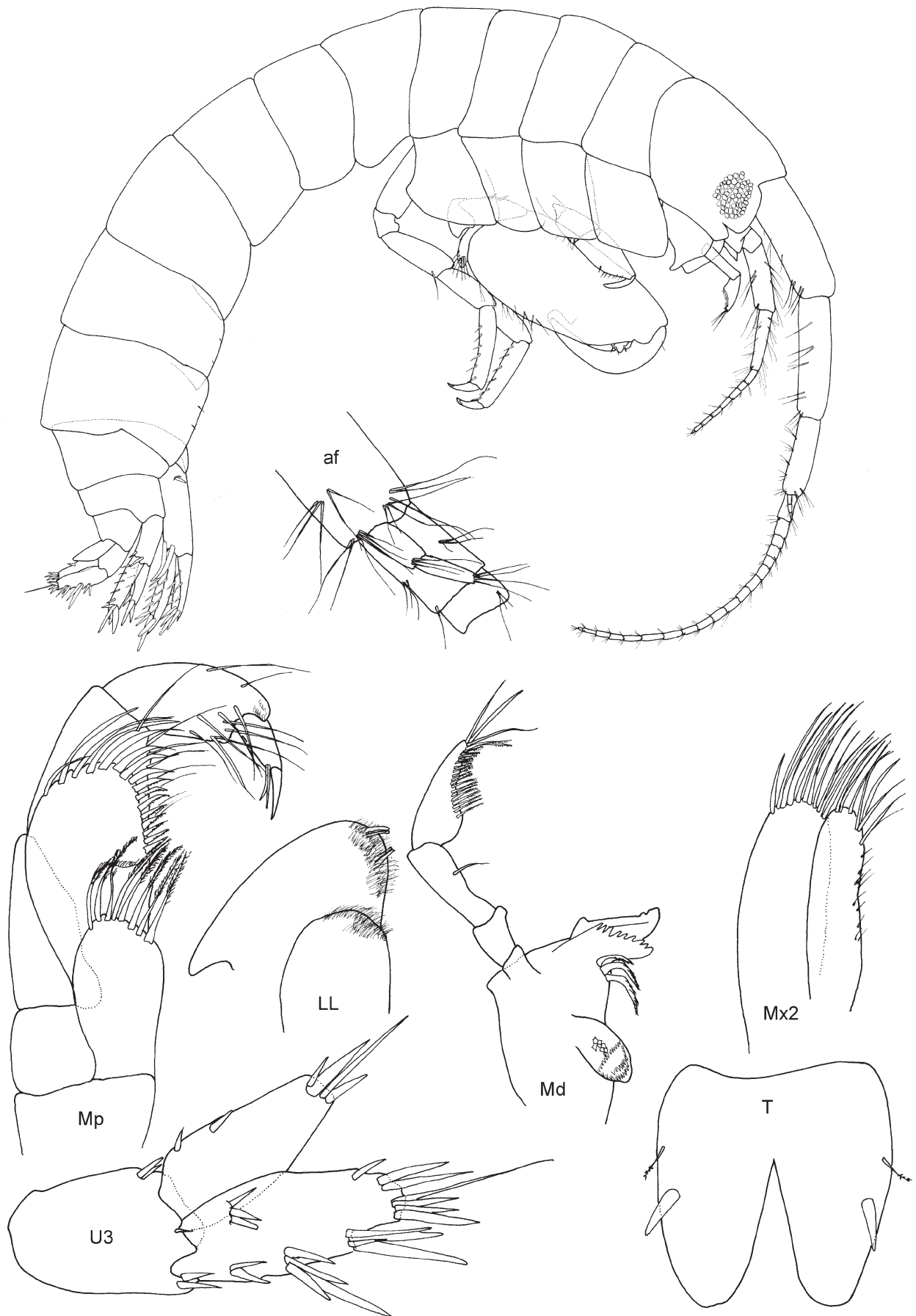
**Pleon.** *Pleonites 1–3* dorsally smooth, without dorsal setae, spines or carinae. *Epimeron 1* posteroventral corner subquadrate. *Epimeron 2* posteroventral corner subquadrate. *Epimeron 3* posteroventral margin smooth, with posteroventral corner subquadrate. *Urosomites 1–3* smooth, without dorsal spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated; inner ramus short (length 2 x breadth), subequal in length to outer ramus; outer ramus longer than peduncle, 1-articulate. *Telson* moderately cleft (30 to 65%), as long as broad, lobes apically rounded, without dorsal robust setae, each lobe without apical/subapical robust setae, with 1 large robust seta on each outer margin.

**Female** (sexually dimorphic characters). Unknown.

**Habitat.** Marine epibenthic, living among coral and on coralline bottoms, in dead staghorn *Acropora* coral and reef rock covered with coralline algae *Lithothamnion* and *Halimeda*.

**Remarks.** *Elasmopus pocillimanus* Bate, 1862 was originally described from Genoa, Italy. The original description was sparse, but the text and illustrations of Karaman (1982) clearly define the species. It has regularly been reported from the Mediterranean Sea (Della Valle 1893; Chevreux 1910; Chevreux & Fage 1925; Karaman 1982) and from the western Atlantic Ocean (see LeCroy 2000).





**FIGURE 9.** *Elasmopus slatyeri* **sp. nov.**, holotype, male, 4.9 mm, AM P30113, Lizard Island, Great Barrier Reef.

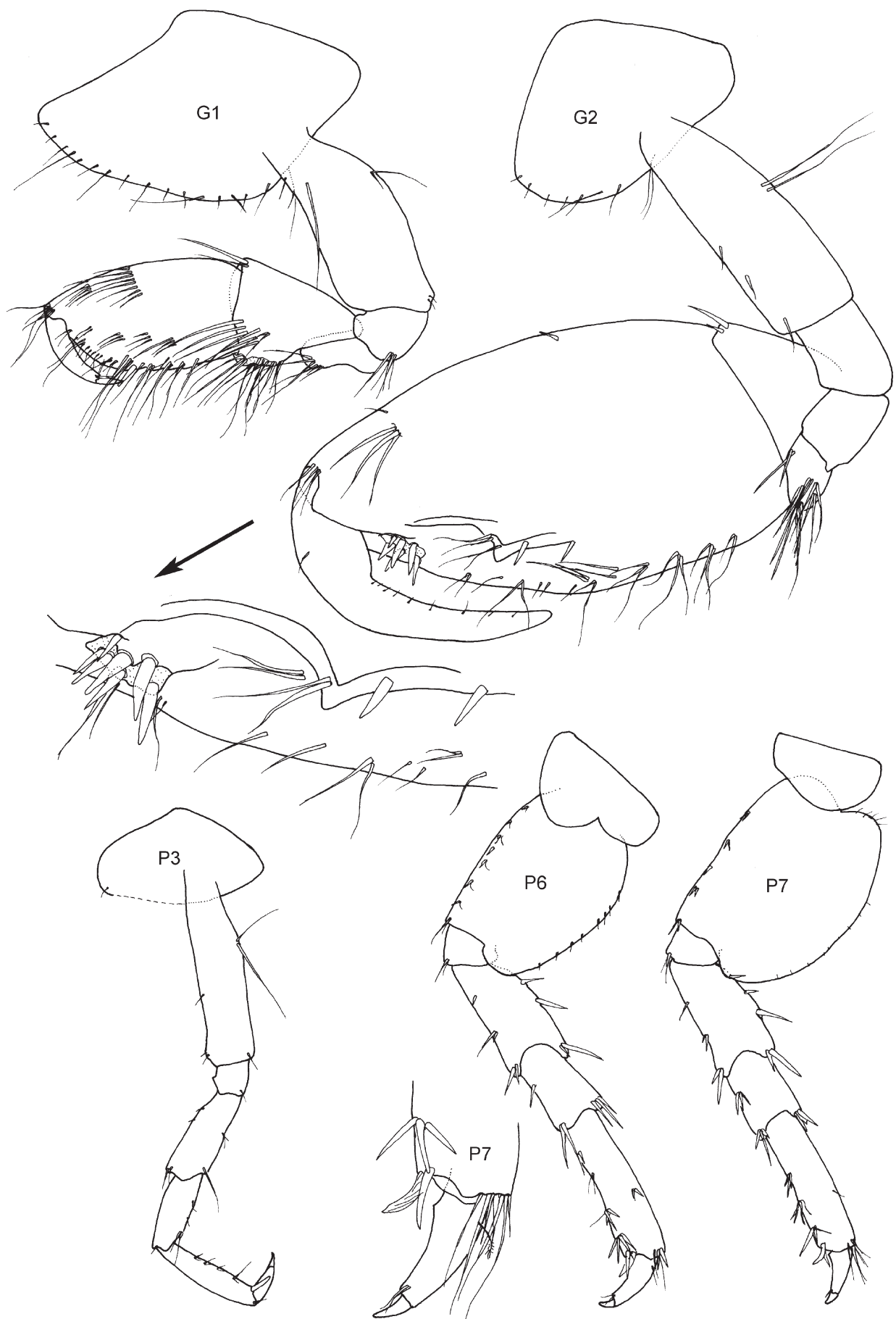


FIGURE 10. *Elasmopus slatyeri* sp. nov., holotype, male, 4.9 mm, AM P30113, Lizard Island, Great Barrier Reef.

Berents (1983) reported *E. pocillimanus* from the Great Barrier Reef. We consider this taxon to be the new species, *Elasmopus slatyeri* **sp. nov.** This species is recognised by the male gnathopod 2 which lacks a distomedial shelf on the palm and has well developed subpalmar sculpturing and by the telson with two large, lateral, robust setae and apically rounded lobes without apical setae. These characters distinguish *E. slatyeri* from all other species of *Elasmopus*, including those on the GBR.

*Elasmopus slatyeri* has also been reported, as *E. pocillimanus*, from a number of places in the Indo-West Pacific: Hawaii (J.L. Barnard 1970, 1971); Madagascar (Ledoyer, 1972, 1973, 1979b, 1983); the Great Barrier Reef (Berents, 1983); and South China Sea (Ren 1998). Only the record of Schellenberg (1938) from Kiribati might be considered as *E. pocillimanus*, based on the illustration of the second gnathopod of a 6 mm male. The adult material reported by J.L. Barnard (1970, 1971) from Hawaii is peculiar in that there is a tiny second article on the outer ramus of uropod.

**Distribution.** *Australia.* Queensland: Lizard Island (Berents 1983). *USA.* Hawaiian Islands: Oahu (J.L. Barnard 1970, 1971). ? *Kiribati.* (Schellenberg 1938). *Madagascar.* Grand Récif de Tuléar (Ledoyer 1972, 1983). *South China Sea.* Nansha (or Spratly) Islands (Ren 1998).

### ***Elasmopus spinicarpus* Berents, 1983**

(Figs 11, 12)

*Elasmopus spinicarpus* Berents, 1983: 121, figs 17–19. —Springthorpe & Lowry, 1994: 31 (catalogue). —Lowry & Stoddart, 2003: 178 (catalogue).

**Material examined.** Holotype male, 8.5 mm, AM P30212 (QLD 39); paratype, female, 5.4 mm, AM P30213 (QLD 39); 3 unsexed, AM P75732 (QLD 1949); 3 unsexed, AM P75730 (QLD 1959); 13 unsexed, AM P75729 (QLD 1988); many unsexed, AM P75731 (QLD 2006).

**Type locality.** Casuarina Beach, Lizard Island, Great Barrier Reef, Australia (14°40.5'S 145°26.6'E).

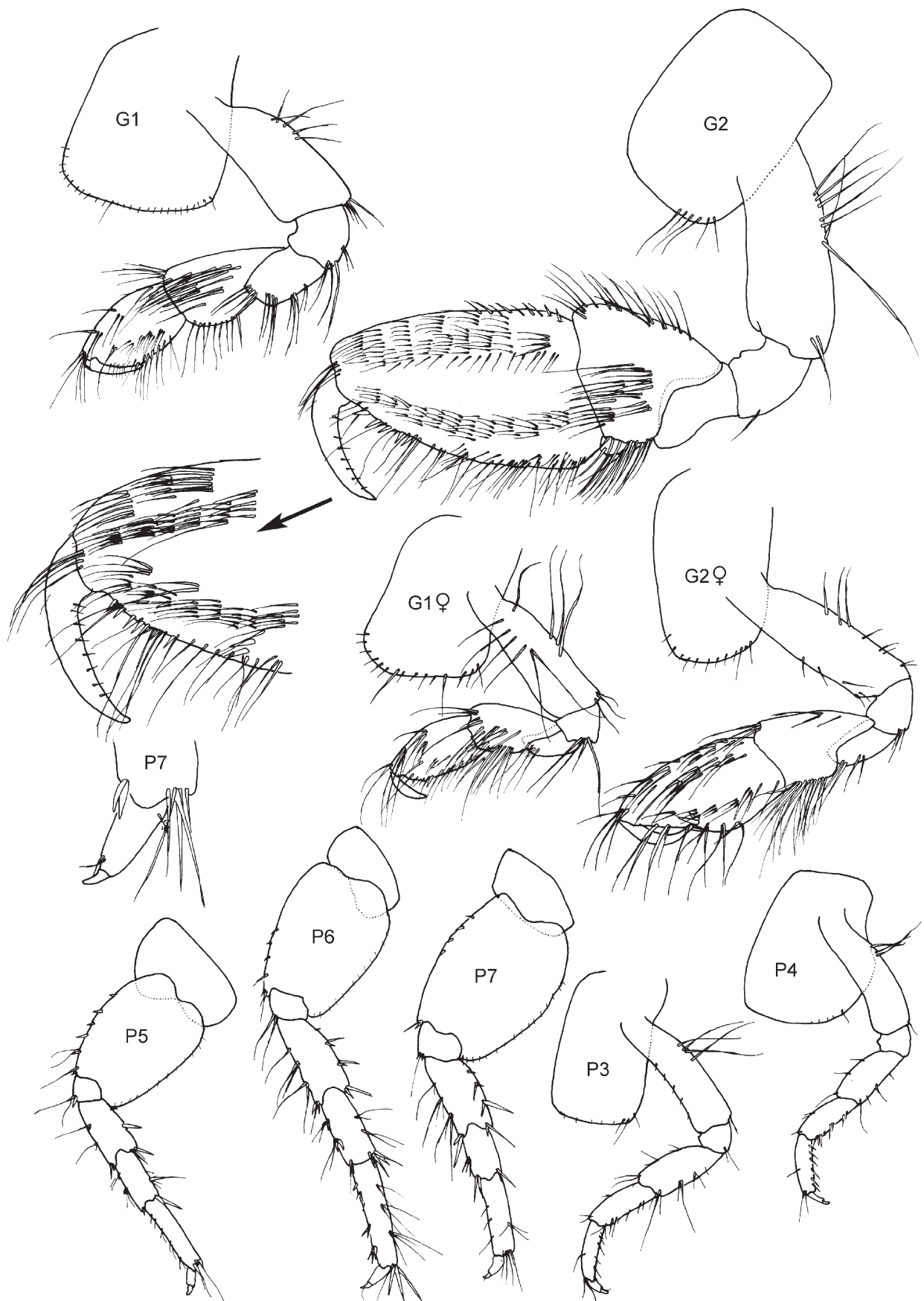
**Description.** Based on holotype male, 8.5 mm, AM P30212.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner subquadrate. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, with 1 distal robust seta on posterior margin; accessory flagellum short, with 3 articles; flagellum with about 17 articles. *Antenna 2* peduncular article 4 as long as article 5; flagellum with 8 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 4 setae; palp well developed, 3-articulate; article 1 about twice as long as broad, shorter than article 2, inner margin article 1 not produced distally; article 2 subequal to article 3; article 3 short (about 2 x as long as broad), strongly falcate, longer than article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner weakly produced, rounded, anterior margin straight; merus without posterodistal tooth; carpus about 2 x as long as broad, slightly longer than propodus, setae covering surface; propodus palm acute, convex, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus with subquadrate distoventral corner; carpus compressed, projecting between merus and propodus, length 1 x breadth; propodus expanded, with slender setae along posterior margin, palm acute, convex, smooth, palm about one third length of propodus, without distomedial shelf, without group of robust setae in shelf area, palmar margin lined with a row of 5 robust setae, without teeth, subpalmar surface smooth, without posteroventral corner, with 2 posterodistal robust setae; dactylus reaching end of palm, closing along palm, without setae on anterior margin, without posteroproximal shelf, apically subacute. *Pereopod 4* coxa posteroventral lobe well developed, with subrectangular posteromedial corner. *Pereopod 5* basis proximally expanded, tapering distally, posterior margin straight, without long slender setae, posteroventral corner narrowly rounded or subquadrate; carpus and propodus without long, slender setae along anterior margin. *Pereopod 6* basis posterior margin straight, without long slender setae, posteroventral corner narrowly rounded; carpus and



**FIGURE 11.** *Elasmopus spinicarpus* Berents 1983, holotype, male, 8.5 mm, AM P30212, Lizard Island, Great Barrier Reef.



**FIGURE 12.** *Elasmopus spinicarpus* Berents 1983, holotype, male, 8.5 mm, AM P30212, paratype, female, 5.4 mm, AM P30213, Lizard Island, Great Barrier Reef.



propodus without long, slender setae along anterior margin; merus and carpus not broadened; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin convex, smooth, without long slender setae, not produced posterodistally, posteroventral corner broadly rounded; merus and carpus not broadened; propodus not expanded posterodistally.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute spine. *Urosomites 1–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long or short; inner ramus subequal in length to outer ramus; inner ramus long (length 2 to 2.5 x breadth); outer ramus long, length 2.4 x breadth, longer than peduncle, 1-articulate. *Telson* deeply cleft (more than 66%), about as long as broad, tapering distally, lobes truncated with lateral apical cusps extending about halfway along longest seta, without dorsal robust setae, each lobe with 3 short apical robust setae, without robust setae on inner and outer margins.

**Female** (sexually dimorphic characters). Paratype, female, 5.4 mm, AM P30213. *Gnathopod 2* smaller and less robust than that of male; carpus short, not lobate, not enclosed by merus and propodus, length 2 x breadth; propodus without sparse setal bunches along posterior margin, palm straight, palmar margin with sparse robust setae, defined by posteroventral corner, with posterodistal robust setae.

**Habitat.** Marine, epibenthic, living under stones near low tide mark and in association with the ophiuroid *Ophiocoma scolopendrina* (Lamarck, 1816).

**Remarks.** This is the first report of *E. spinicarpus* since its original description by Berents (1983). The new records extend the distribution of the species from Lizard Island in the northern part of the GBR to One Tree Island towards the southern end.

*Elasmopus spinicarpus* Berents, 1983 is possibly the sister species to *E. seticarpus* Myers, 1985. Both species have short strongly falcate third articles on the mandibular palp, long telson with short apical setae and relatively simple palm on the male second gnathopods. However the carpus of *E. spinicarpus*, although strongly setose, is much less so than that of *E. seticarpus*.

On the GBR *E. spinicarpus* is similar to *E. alalo* and *E. varanocephalensis*, based on the elongate, deeply cleft telson. *Elasmopus spinicarpus* differs from the latter species in having a strongly falcate third article on the mandibular palp; a straight anterior margin on the first coxa; and rows of short, medial, slender setal on the male gnathopod 2 propodus and expanded carpus.

**Distribution.** *Australia.* Queensland: Lizard Island (Berents 1983); One Tree Island (currently study).

***Elasmopus varanocephalensis* sp. nov.**  
(Figs 13, 14)

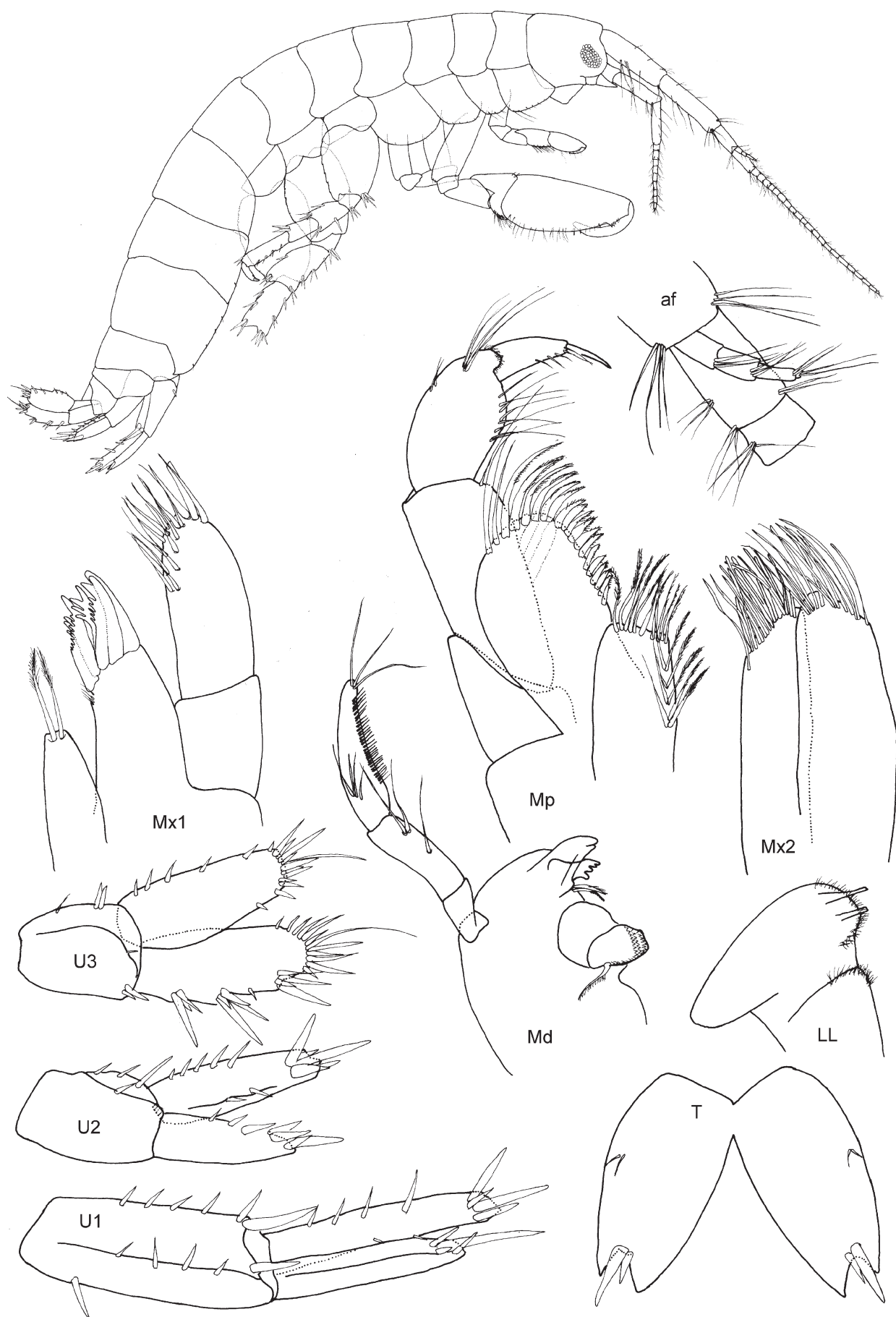
**Type material.** Holotype, male, 8.0 mm, AM P78067, south of Lizard Head, Lizard Island (14°41'S 145°27'E), rubble, 2 m, J.D. Thomas, 29 January 1989 (JDT/LIZ 14c).

**Type locality.** South of Lizard Head, Lizard Island, Queensland, Australia (14°41'S 145°27'E).

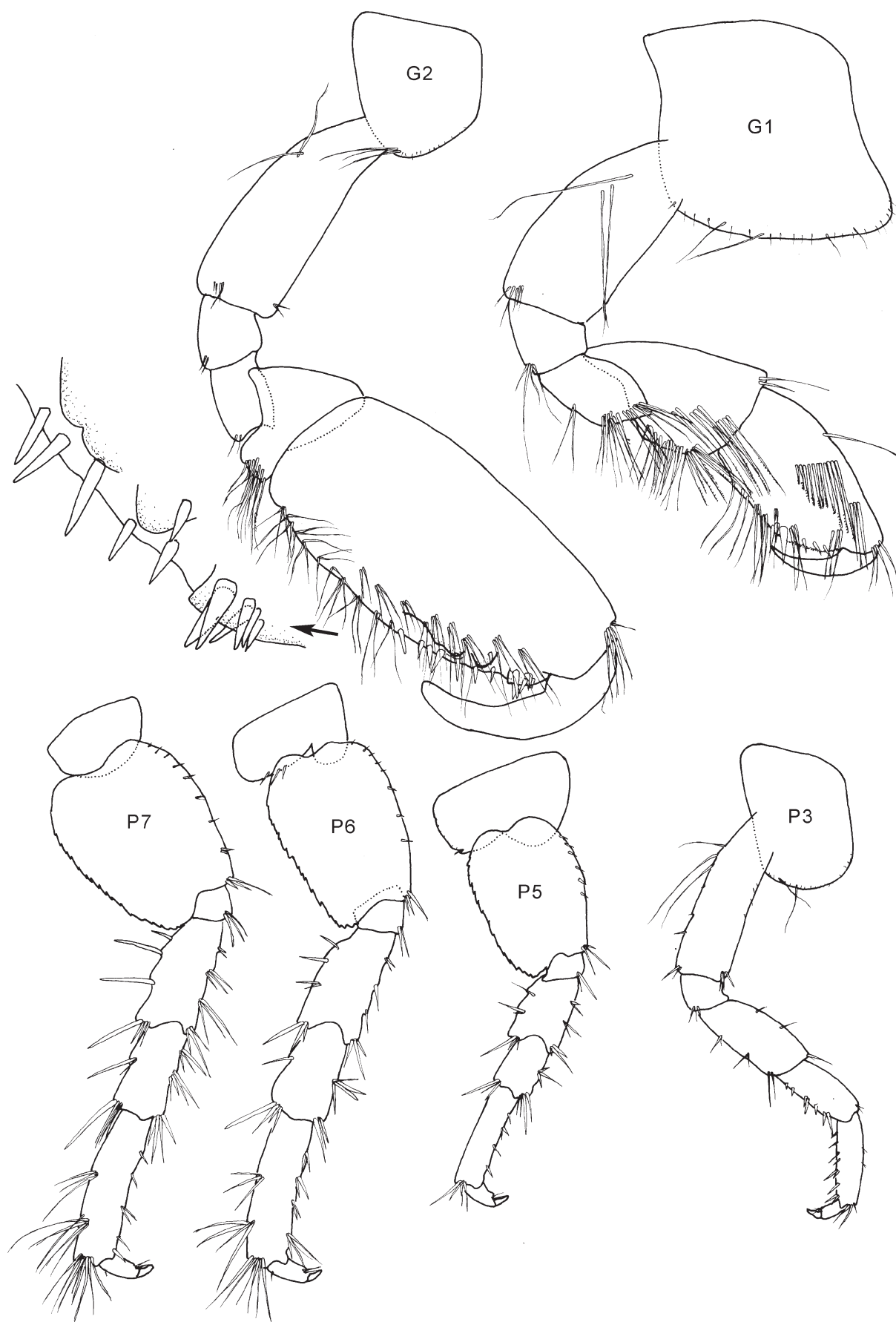
**Etymology.** Named for the type locality, Lizard Head.

**Description.** Based on holotype male, 8.0 mm, AM P78067.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, without robust setae along posterior margin; article 2 longer than article 3; accessory flagellum short, with 4 articles; flagellum with 21 articles. *Antenna 2* peduncular article 4 subequal in length to article 5; flagellum with 9 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 2 setae; palp well developed, 3-articulate; article 1 about as long as broad, shorter than article 2, inner margin not produced distally; article 2 shorter than article 3; article 3 long (4 x as long as broad), weakly falcate, longer than article 1.



**FIGURE 13.** *Elasmopus varanocephalensis* **sp. nov.**, holotype, male, 8.0 mm, AM P78067, Lizard Island, Great Barrier Reef.



**FIGURE 14.** *Elasmopus varanocephalensis* sp. nov., holotype, male, 8.0 mm, AM P78067, Lizard Island, Great Barrier Reef.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, carpus subequal in length to propodus; propodus with setae in anterodistal bunches and along posterior margin; propodus palm acute, slightly convex, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus with subquadrate distoventral corner; carpus compressed, projecting between merus and propodus, length 1 x breadth; propodus expanded, without setal bunches along posterior margin, palm acute, slightly convex, slightly sculptured, palm about one third length of propodus, with reduced subtriangular distomedial shelf, with 6 robust setae on shelf, without midmedial excavation, palmar margin lined with a row of 6 robust setae, without teeth, subpalmar surface with short proximal subpalmar seam forming two nodules, without posteroventral corner, with posterodistal robust setae; dactylus reaching end of palm, closing along palm, without setae on anterior margin, without posteroproximal shelf, apically blunt. *Pereopod 4* coxa posteroventral lobe slightly developed, with rounded posteromedial corner. *Pereopod 5* basis slightly expanded, posterior margin straight, without long slender setae, posteroventral corner narrowly subquadrate; carpus and propodus without long, slender setae along anterior margin. *Pereopod 6* basis posterior margin straight, minutely castelloserrate, without long slender setae, posteroventral corner narrowly rounded; carpus and propodus without long, slender setae along anterior margin; merus and carpus not broadened; propodus slightly expanded posterodistally to form a hood-like projection. *Pereopod 7* basis posterior margin convex, with posterior margin minutely castelloserrate, not produced posterodistally, without long slender setae, posteroventral corner broadly rounded; merus and carpus not broadened; propodus expanded posterodistally to form a hood-like projection.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner with small acute spine. *Epimeron 2* posteroventral corner with small acute spine. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute spine. *Urosomites 1–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally rounded, apical robust setae long or short; inner ramus subequal in length to outer ramus; inner ramus long (length 2 to 2.5 x breadth); outer ramus short, length 2.2 x breadth, longer than peduncle, 1-articulate. *Telson* deeply cleft (more than 66%), longer than broad, tapering distally, each lobe with long inner and short outer apical cusps, apical conical extension reaching at least halfway along longest seta, without dorsal robust setae, with apical/subapical robust setae, each lobe with 2 long and short apical robust setae, without robust setae on outer and inner margins.

**Female** (sexually dimorphic characters). Unknown.

**Habitat.** Marine, epibenthic, living in coral rubble.

**Remarks.** *Elasmopus varanocephalensis* **sp. nov.** is most similar to *E. alalo* Myers, 1986b, *E. spinicarpus* Berents, 1983 and *E. seticarpus* Myers, 1985. All of these species have an elongate, deeply cleft telson with short subapical setae and a relatively plain palm on male gnathopod 2. *Elasmopus varanocephalensis* differs from *E. alalo* in having a very reduced distomedial shelf, no midmedial excavation, a single row of robust setae on the palm and two subpalmar nodules of male gnathopod 2. It differs from *E. spinicarpus* in the presence of a weak posterodistal shelf on male gnathopod 2. Although the palms are more similar between *E. varanocephalensis* and *E. seticarpus*, the extremely setose carpus of male gnathopod 2 in *E. seticarpus* distinguishes these species.

**Distribution.** *Australia*. Queensland: Lizard Island (current study).

***Mallacoota* J.L. Barnard, 1972a**

***Mallacoota balara* Berents, 1983**

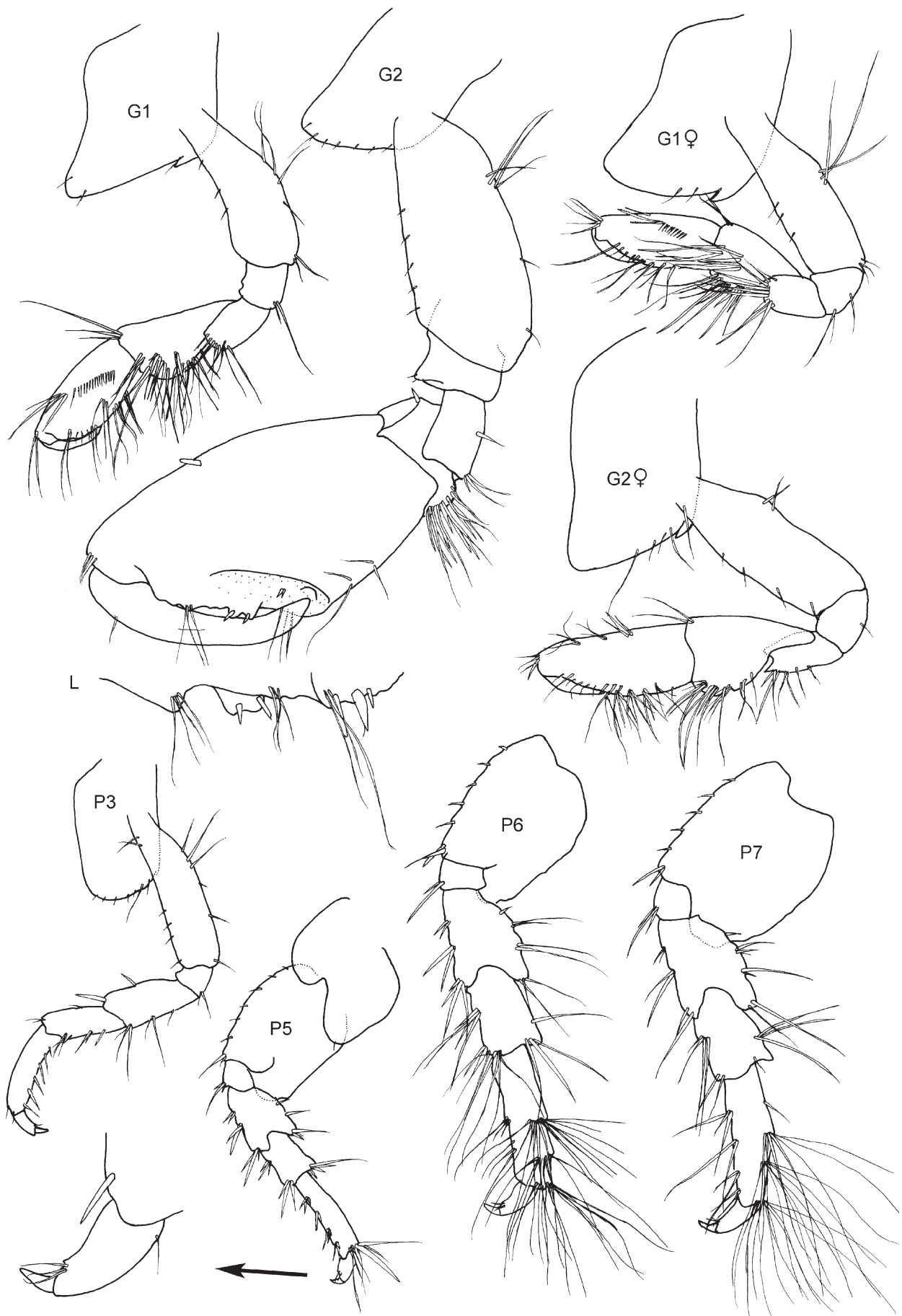
(Figs 15, 16, Pl. 4F)

*Mallacoota balara* Berents, 1983: 133, figs 25, 26. —Springthorpe & Lowry, 1994: 10 (catalogue). —Lowry & Stoddart, 2003: 182 (catalogue).



**FIGURE 15.** *Mallacoota balara* Berents 1983, male, 6.6 mm, AM P78027, Lizard Island, Great Barrier Reef.





**FIGURE 16.** *Mallacoota balara* Berents 1983, male, 6.6 mm, AM P78027, female, 5.9 mm, AM P78028, Lizard Island, Great Barrier Reef.

**Material examined.** 3 unsexed, AM P75882 (76 LIZ A 03.15.1); 5 unsexed, AM P75894 (76 LIZ A 03.15.1); 5 unsexed, AM P75821 (76 LIZ A 03.15.2); 2 unsexed, AM P75823 (76 LIZ A-6.18.3); 1 unsexed, AM P75886 (76 LIZ A 9.12.1); 7 unsexed, AM P75824 (76 LIZ A 9.18.3); 1 unsexed, AM P75891 (76 LIZ B 3); 1 unsexed, AM P75820 (76 LIZ B 00.03.1); 6 unsexed, AM P75885 (76 LIZ B 03.12.2); 2 unsexed, AM P75893 (76 LIZ B 03.12.3); 1 unsexed, AM P75892 (76 LIZ B 4); 6 unsexed, AM P75890 (76 LIZ B 6.18.3); 7 unsexed, AM P75888 (76 LIZ B.06.18.3); 3 unsexed, AM P75822 (76 LIZ B 09.15.2); 1 unsexed, AM P75884 (76 LIZ B 09.15.3); 3 unsexed, AM P75818 (76 LIZ B 9.18.1); 1 unsexed, AM P75819 (76 LIZ B 9.21.1); 3 unsexed, AM P75889 (76 LIZ B 09.21.2); 3 unsexed, AM P75883 (76 LIZ B 12.18.1); 7 unsexed, AM P75887 (76 LIZ B 12.21.2); 7 unsexed, AM P75817 (76 LIZ B 12.24.3); 1 unsexed, AM P75814 (JDT/LIZ 5); 10 unsexed, AM P75816 (JDT/LIZ 14); 5 unsexed, AM P70710 (QLD 1637); 4 unsexed, AM P70678 (QLD 1641); 1 unsexed, AM P70785 (QLD 1670); 1 male, 6.6 mm, 6 slides, AM P78027 (QLD 1670); 7 unsexed, AM P70969 (QLD 1687); 2 unsexed, AM P70861 (QLD 1689); 6 unsexed, AM P70994 (QLD 1693); 3 unsexed, AM P71104 (QLD 1733); 1 female, 5.9 mm, 5 slides, AM P78028 (QLD 1733); 1 unsexed, AM P71196 (QLD 1736); 2 unsexed, AM P71273 (QLD 1773); 1 unsexed, AM P71322 (QLD 1781); 1 unsexed, AM P75815 (QLD 1787); 2 unsexed, AM P71465 (QLD 1797).

**Type locality.** Fringing reef between Bird Islet and South Island, Lizard Island Great Barrier Reef (14°42'S 145°28'E).

**Description.** Based on male, 6.6 mm, AM P78027.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, with 1 robust seta on posterior margin; article 2 longer than article 3; accessory flagellum short, with 3 articles; flagellum with 21 articles. *Antenna 2* peduncular article 4 longer than article 5; flagellum with 8 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 3 setae; palp reduced, 3-articulate; article 1 about twice as long as broad, longer than article 2, inner margin article 1 not produced distally; article 2 shorter than article 3; article 3 short (about 3 x as long as broad), rectilinear, subequal to article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, carpus subequal in length to propodus, setae in anterodistal bunches and along posterior margin; propodus palm acute, straight, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch present; basis broad; merus with subquadrate distoventral corner; carpus compressed, projecting between merus and propodus; propodus expanded, without setal bunches along posterior margin, palm slightly acute, concave, sculptured, palm about half length of propodus, with slight subtriangular distomedial shelf, without group of robust setae on shelf, with slight midmedial excavation, palmar margin with 2 robust setae, with subacute tooth, subpalmar surface with platform, with posteroventral corner, with 1 posterodistal robust seta; dactylus reaching end of palm, closing into socket, without setae on anterior margin, without posteroproximal shelf, apically subacute. *Pereopod 5* basis expanded, posterior margin slightly concave, without long slender setae, posteroventral corner broadly rounded; carpus and propodus with few long, slender setae along anterior margin. *Pereopod 6* basis posterior margin straight, without long slender setae, posteroventral corner broadly rounded; carpus and propodus with many long, slender setae along margins; merus and carpus broadened; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin convex, smooth, without long slender setae, produced posterodistally (lobate), posteroventral corner broadly rounded; merus and carpus broadened; propodus not expanded posterodistally.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner with small acute spine. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute spine. *Urosomites 1–3* without dorsal spines. *Urosomite 1* bicarinate. *Urosomites 2–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long or short; inner ramus subequal in length to outer ramus, short (length less than 2 x breadth); outer ramus short (length x x

breadth), slightly longer than peduncle, 1-articulate. *Telson* moderately cleft (30 to 65%), broader than long, short, truncated distally, apical margins concave, apical conical extension reaching scarcely one third along longest seta, without dorsal robust setae, with apical/subapical robust setae, each lobe with 4 apical robust setae, apical robust setae long or short, without robust setae on outer or inner margins.

**Female** (sexually dimorphic characters). Based on paratype female, 8 mm, AM P30134. *Gnathopod 2* carpus long; propodus subrectangular, palm acute with broadly rounded corner, straight, smooth, without distomedial shelf, without robust setae along palm, subpalmar distomedial surface smooth.

**Habitat.** Marine, epibenthic, living among algae.

**Remarks.** Only three species on the GBR have a well defined corner on the palm of male gnathopod 2: *M. balara*, *M. chandaniae* and *M. scopulosa*. *Mallacoota balara* differs from the latter two in not having a tooth define the palmar corner and in having a broad basis on the male gnathopod 2.

**Distribution.** *Australia*. Queensland: Lizard Island (Berents 1983, current study).

### ***Mallacoota capricornia* sp. nov.**

(Figs 17, 18)

*Mallacoota insignis*. —Myers, 1985: 117, figs 93, 94. —Ledoyer, 1983: 552, fig. 210 (in part).

**Type material.** Holotype, male, 6.5 mm (6 slides), AM P78030, Picnic Beach, Palfrey Island, Lizard Island (14°41.69'S 145°26.89'E), green alga *Codium* sp., reef flat, 2 m, T. Krapp-Schickel, 27 February 2005 (QLD 1716). Paratype: female, 7.6 mm (5 slides), AM P78032 (QLD 1716).

**Additional material examined.** 1 unsexed, AM P75812 (75 LIZ 11-2); 1 unsexed, AM P75654 (76 LIZ A 03.12.2); 5 unsexed, AM P30814 (HI-B3-11); 1 unsexed, AM P78035 (QLD 1319); 10 unsexed, AM P78034 (QLD 1336); 1 unsexed, AM P70569 (QLD 1618); 5 unsexed, AM P70930 (QLD 1698); 3 unsexed, AM P71078 (QLD 1704); 5 unsexed, AM P71035 (QLD 1708); 1 male, 6.6 mm, 1 slide, AM P78031 (QLD 1716); 3 unsexed, AM P71088 (QLD 1716); 7 unsexed, AM P71151 (QLD 1732); 1 unsexed, AM P75653 (QLD 1801); 2 unsexed AM P75620 (QLD 1846); 2 unsexed, AM P75745 (QLD 1851); 2 unsexed, AM P78033 (QLD 1901); many unsexed, AM P75737 (QLD 1940); 6 unsexed AM P75738 (QLD 1941); many unsexed, AM P75849 (QLD 1951); many unsexed, AM P75739 (QLD 1967); many unsexed, AM P75740 (QLD 1978); 6 unsexed AM P75736 (QLD 2000); many unsexed, AM P75734 (QLD 2006); 10+ unsexed, AM P78297 (NT 63); 27 unsexed, AM P78298 (NT 65); 10+ unsexed, AM P78299 (NT 66).

**Type locality.** Picnic Beach, Palfrey Island, Lizard Island, Queensland, Australia (14°41.69'S 145°26.89'E).

**Etymology.** This species takes its name from the Capricorn area of north-eastern Australia.

**Description.** Based on holotype, male, 6.5 mm, AM 71078.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 slightly longer than article 2, with 3 robust setae along posterior margin; article 2 longer than article 3; accessory flagellum minute, with 2–3 articles; flagellum with 29–30 articles. *Antenna 2* peduncular article 4 slightly longer than article 5; flagellum with 8 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 4 setae; palp reduced, 3-articulate; article 1 about twice as long as broad, subequal in length to article 2, inner margin article 1 not produced distally; article 2 subequal to article 3; article 3 long (more than 3 x as long as broad), rectolinear, subequal in length to article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin straight; merus without posterodistal tooth; carpus about 2 x as long as broad, subequal in length to propodus, setae in anterodistal bunches and along posterior margin; propodus palm acute, straight, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus with subquadrate distoventral corner; carpus compressed, projecting between merus and

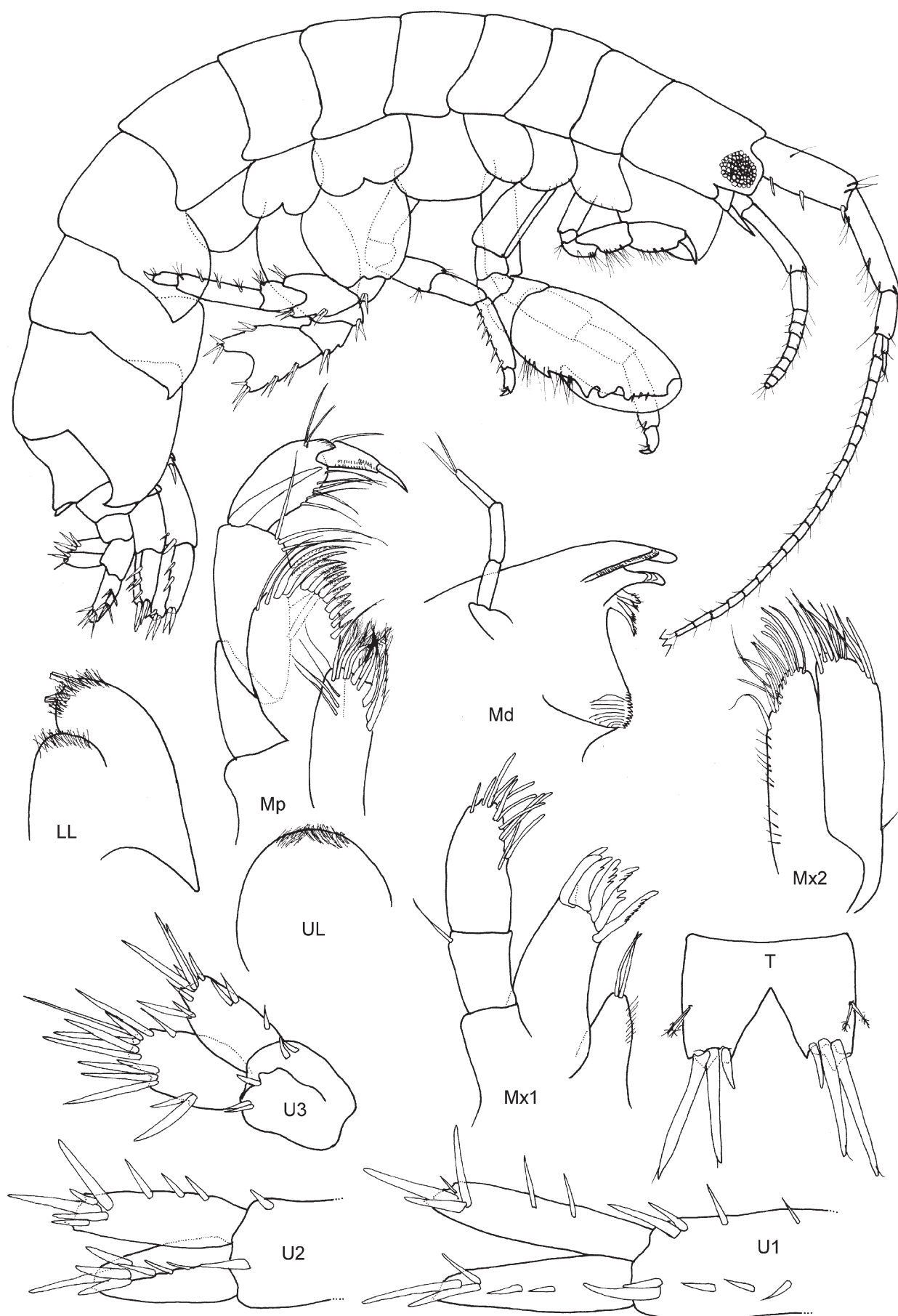
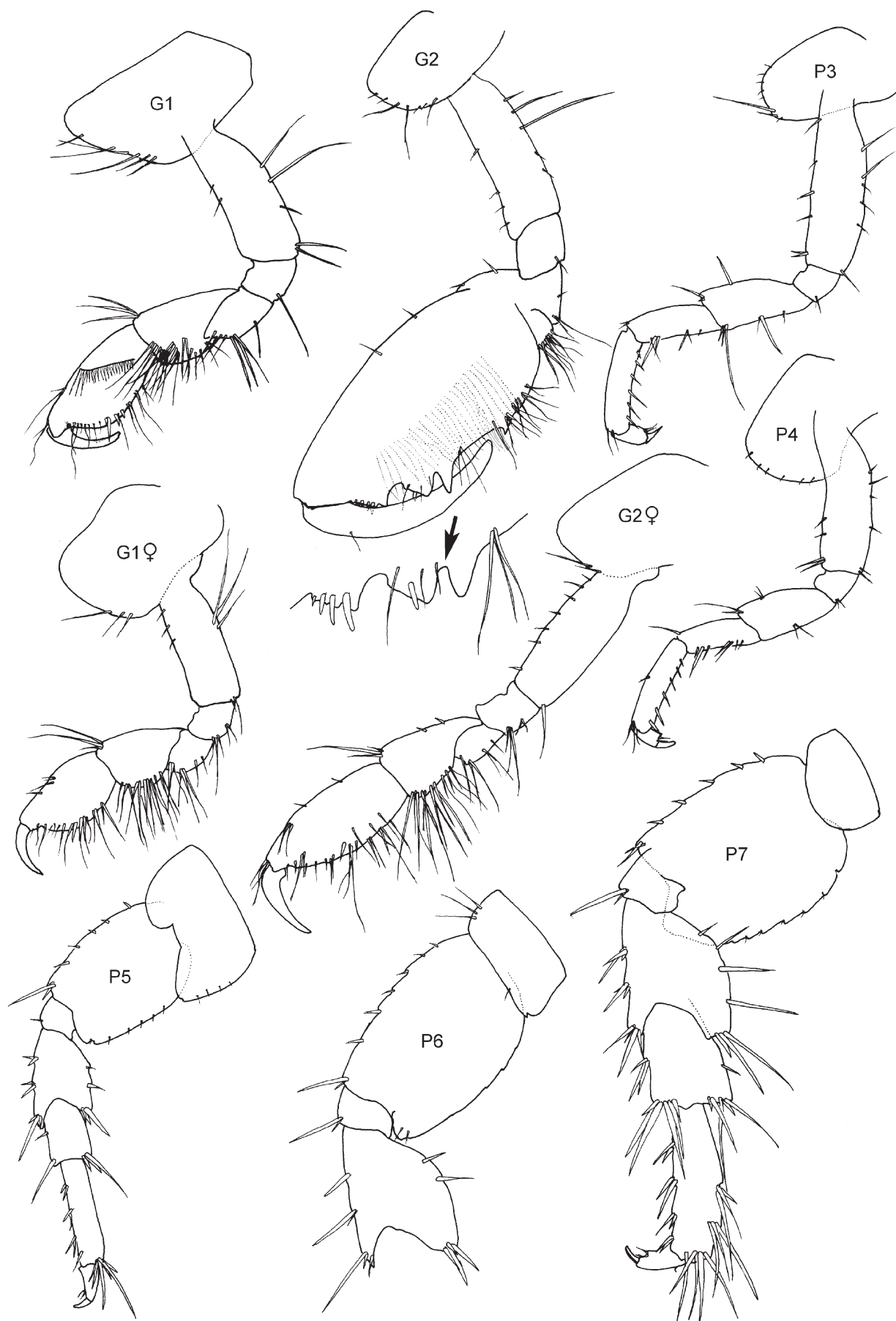


FIGURE 17. *Mallacoota capricornia* sp. nov., holotype, male, 6.5 mm, AM P71078, Lizard Island, Great Barrier Reef.



**FIGURE 18.** *Mallacoota capricornia* **sp. nov.**, holotype, male, 6.5 mm, AM P71078, paratype, female, 7.6 mm, AM P78032, Lizard Island, Great Barrier Reef.



propodus, length 0.6 x breadth; propodus expanded, with slender medial setal bunch, palm acute, convex, sculptured, palm about two thirds length of propodus, with subtriangular distomedial shelf, with group of 4 robust setae on shelf, with small midmedial excavation, palmar margin with sparse 1 robust seta along palm, with 2 subacute teeth, subpalmar surface smooth, corner defined by posteroventral tooth, without posterodistal robust setae; dactylus not reaching end of palm, closing along palm, without setae on anterior margin, without posteroproximal shelf, apically blunt. *Pereopod 4* coxa posteroventral lobe slightly developed, with subacute posteromedial corner. *Pereopod 5* basis expanded, posterior margin straight, without long slender setae, posteroventral corner narrowly rounded; carpus and propodus without long, slender setae along anterior margin. *Pereopod 6* basis posterior margin slightly convex, without long slender setae, posteroventral corner narrowly rounded; carpus and propodus without long, slender setae along anterior margin; merus and carpus broadened; propodus slightly expanded posterodistally to form a hood-like projection. *Pereopod 7* basis posterior margin convex, minutely castelloserrate, without long slender setae, not produced posterodistally, posteroventral corner narrowly rounded or subquadrate; merus and carpus broadened; propodus slightly expanded posterodistally to form a hood-like projection.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner with small acute or subacute spine. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute spine. *Urosomite 1* bicarinate, subtriangular. *Urosomites 2–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long or short; inner ramus subequal in length to outer ramus, long (length 2 to 2.5 x breadth); outer ramus short (length 1.9 x breadth), longer than peduncle, 1-articulate. *Telson* moderately cleft (30 to 65%), broader than long, short, lobes apically truncated, apical conical extension reaching scarcely one third along longest seta, without dorsal robust setae, each lobe with 3 apical long and short robust setae, without robust setae on inner and outer margins.

**Female** (sexually dimorphic characters). Based on paratype female, 7.6 mm, AM P78032. *Gnathopod 2* carpus long, length 1.6 x breadth, not enclosed by merus and propodus; propodus subrectangular, half length of propodus, smooth, without distomedial shelf, without teeth along margin, without posteroventral corner, with posterodistal robust setae.

**Habitat.** Marine, epibenthic, among algae, coral rubble and sponges.

**Remarks.** Pirlot (1936) considered that *Gammarus indicus* Dana, 1853 (described from the Balabac Strait, Sabah) might be a female of the species now known as *Mallacoota insignis* (Chevreux, 1901). Dana's (1853) whole animal illustration (pl. 66, fig. 4) shows a female with a bicarinate urosomite 1, but other details are lacking or misleading. For instance the lateral cephalic lobe is not notched. Based on the available evidence Dana's taxon could be in the genus *Mallacoota* or *Parelasomopus* and the species is indeterminate. The Australian material of *Mallacoota capricornia* **sp. nov.** compares well with the descriptions of *Mallacoota insignis* (Chevreux, 1901), J.L. Barnard (1970), Ledoyer (1983), Myers (1985). One difference is pereopods 5–7 which are much broader in Chevreux's material from the Seychelles. As males of some *Mallacoota* species mature the distal articles (merus and carpus) of these pereopods become immensely broadened.

A more significant difference is the structure of the palm in male gnathopod 2. In the current material of *M. capricornia* from the GBR (6.5 mm) and the material of Myers (1985) from Fiji (8 mm) there is a small cusp defining the end of the palm which is not apparent in the illustrations of Chevreux 1901 (no size), J.L. Barnard 1970 (7.7 mm), Ledoyer 1983 (8 mm) and Appadoo *et al.*, 2002 (7.2 mm). Myers (1985) stated that the lack of a cusp occurs in juveniles, which is true in his material, but Chevreux, Barnard, Ledoyer and Appadoo *et al.* have all illustrated fully mature specimens. Ledoyer (1983) also showed an individual with the cusp (5.5 mm) which indicates that he had two species in his samples.

It is difficult to assess the records of *M. insignis* studied by Schellenberg (1938). Although there were large males in his study material, Schellenberg illustrated the second gnathopod of two juveniles (3 mm and 4.5 mm) from unnamed localities. The illustrations do not compare well with juvenile second gnathopods

illustrated by Ledoyer 1983 and Myers 1985, and leave his records suspect. This is unfortunate because Schellenberg reported on material from a number of Pacific localities – Kiribati (Gilbert Islands), Tuvalu (Ellice Islands), Fiji, Hawaii and the Philippine Islands.

*Mallacoota capricornia* aligns with species in which the male gnathopod 2 palm is defined by a tooth. On the GBR the only other species with a tooth defining the palm is *M. chandaniae* which differs from *M. capricornia* by its massive, tranverse male second gnathopod.

**Distribution.** *Australia*. Northern Territory: New Year Island (current study). Queensland: Hawkesbury Island, Horn Island, Torres Strait; Heron Island; One Tree Island (current study). *Fiji*. Momi Bay, Malevu, Votualailai, Nukumbutho Island, Makuluva Island, Mburelevu (Myers 1985). *Madagascar*. Tuléar (Ledoyer 1979b, 1983).

### ***Mallacoota chandaniae* Lowry & Springthorpe, 2005**

(Figs 19, 20)

*Mallacoota chandaniae* Lowry & Springthorpe, 2005: 257–260, figs. 17–19.

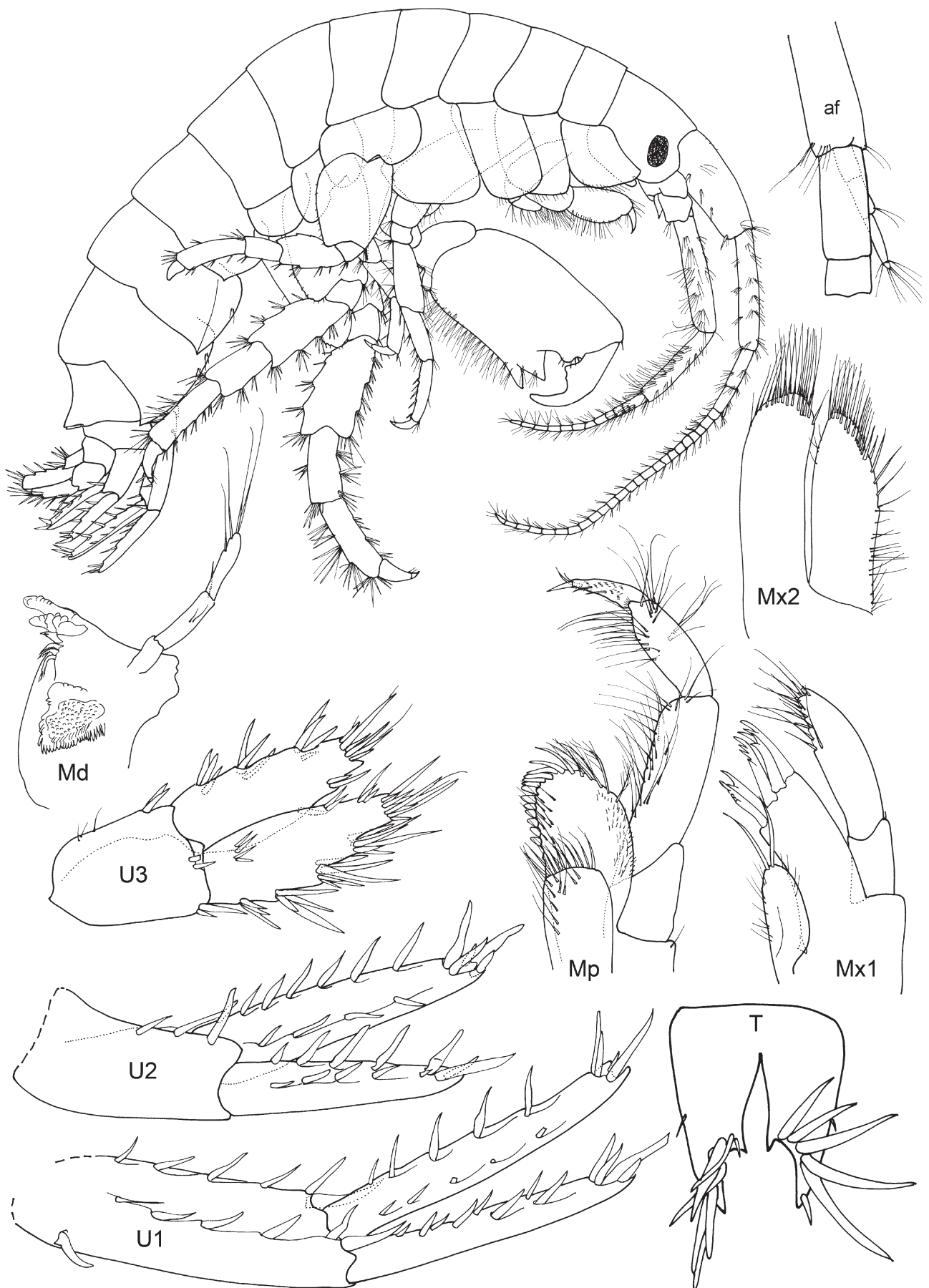
**Material examined.** 24 unsexed, AM P75622 (QLD 1846); 2 unsexed, NTM Cr001801 (MAGNT 2); 5 unsexed, NTM Cr011627 (MAGNT 7); 1 unsexed, NTM Cr011717 (MAGNT 10); 1 unsexed, NTM Cr011700 (MAGNT 12); 1 unsexed, NTM Cr011703 (MAGNT 13); 7 unsexed, NTM Cr015660 (MAGNT 15); 2 unsexed, NTM Cr015561 (MAGNT 17); 1 unsexed, NTM Cr015617 (MAGNT 17); 1 unsexed, NTM Cr015646 (MAGNT 17); 2 unsexed, NTM Cr015603 (MAGNT 17); 3 unsexed, NTM Cr015642 (MAGNT 17); 4 unsexed, NTM Cr015555 (MAGNT 18); 8 unsexed, NTM Cr015578 (MAGNT 18); 10 unsexed, NTM Cr015591 (MAGNT 18); 10+ unsexed, NTM Cr015607 (MAGNT 18); 2 unsexed, NTM Cr015665 (MAGNT 18); 1 unsexed, NTM Cr015729 (MAGNT 19); 2 unsexed, NTM Cr015736 (MAGNT 19); 3 unsexed, NTM Cr015765 (MAGNT 20); 3 unsexed, Cr015771 (MAGNT 20); 2 unsexed, Cr015750 (MAGNT 20); 1 unsexed, NTM Cr015751 (MAGNT 20); 2 unsexed, NTM Cr015752 (MAGNT 20); 1 unsexed, NTM Cr015927 (MAGNT 21); 1 unsexed, NTM Cr015490 (MAGNT 29); 10+ unsexed, NTM Cr015491 (MAGNT 29); 4 unsexed, NTM Cr015496 (MAGNT 29); 2 unsexed, NTM Cr016744 (MAGNT 32); 11 unsexed, NTM Cr016741 (MAGNT 36); 2 unsexed, NTM Cr016747 (MAGNT 3); 1 unsexed, NTM Cr016740 (MAGNT 37); 6 unsexed, NTM Cr016746 (MAGNT 15); 1 unsexed, NTM Cr016742 (MAGNT 35); 4 unsexed, NTM Cr016743 (MAGNT 16); 3 unsexed NTM Cr016745 (NS056); 7 unsexed, AM P78293 (NT 1); 2 unsexed, AM P78296 (NT 89); 19 unsexed, AM P78294 (NT 326); 9 unsexed, AM P78295 (NT 345).

**Type locality.** At end of sugar loading jetty, 5 km long, Lucinda, Queensland, Australia (~18°31'S 146°19'E).

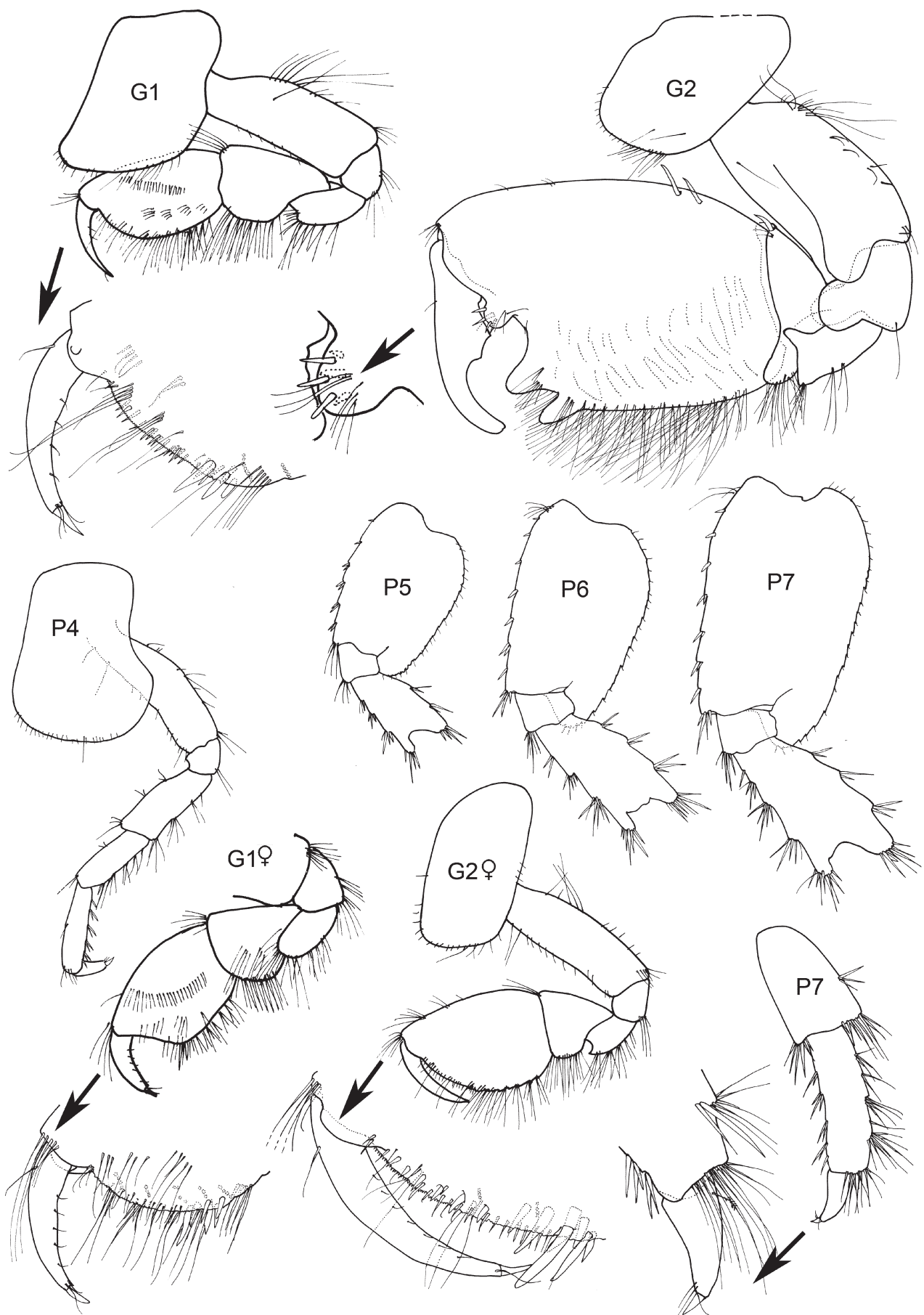
**Description.** Based on holotype, male, 11 mm, AM P59021.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, with 4 or more robust setae along posterior margin; article 2 longer than article 3; accessory flagellum short, with 4 articles; flagellum with about 26 articles. *Antenna 2* peduncular article 4 longer than article 5; flagellum with about 11 articles. *Mandible* incisor a smooth cutting edge with many small apicomedial cusps; accessory setal row with 3 setae; palp reduced, 3-articulate; article 1 about twice as long as broad, shorter than article 2, inner margin article 1 not produced distally; article 2 subequal to article 3; article 3 long (more than 3 x as long as broad), rectilinear, longer than article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, carpus shorter than propodus, setae in anterodistal bunches and along posterior margin; propodus palm acute, convex, entire, without posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis broad; merus with subquadrate distoventral corner; carpus compressed, projecting between merus and propodus,



**FIGURE 19.** *Mallacoota chandaniae* Lowry & Springthorpe, 2005, holotype, male, 11 mm, AM 59021, Lucinda, Queensland (After Lowry & Springthorpe, 2005).



**FIGURE 20.** *Mallacoota chandaniae* Lowry & Springthorpe, 2005, holotype, male, 11 mm, AM 59021, paratype, female, 9.1 mm, Lucinda, Queensland (After Lowry & Springthorpe, 2005).



length 0.5 x breadth; propodus massive, with 2 robust setae on anterior margin, with slender medial setal bunch, palm nearly transverse, sculptured, palm about half length of propodus, with rounded distomedial shelf, with group of 6 robust setae on shelf, with midmedial excavation, palmar margin without robust setae, with 1 subacute tooth, subpalmar surface smooth, corner defined by posteroventral tooth, without posterodistal robust setae; dactylus reaching end of palm, closing along palm, with 1 seta on anterior margin, without posteroproximal shelf, apically blunt. *Pereopod 4* coxa posteroventral lobe well developed, with subrectangular posteromedial corner. *Pereopod 5* basis slightly expanded, posterior margin straight, without long slender setae, posteroventral corner broadly rounded; carpus and propodus without long, slender setae along anterior margin. *Pereopod 6* basis posterior margin straight, without long slender setae, posteroventral corner broadly rounded; merus and carpus not broadened; carpus and propodus without long, slender setae along anterior margin; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin straight, minutely castelloserrate, without long slender setae, produced posterodistally lobate, posteroventral corner narrowly rounded; merus and carpus not broadened; propodus not expanded posterodistally.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner with small acute or subacute spine. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with strongly produced acute spine. *Urosomite 1* bicarinate, subtriangular. *Urosomites 2–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long and short; inner ramus subequal in length to outer ramus, long (length more than 2 x breadth); outer ramus long (length 2.4 x breadth), longer than peduncle, 1-articulate. *Telson* deeply cleft (more than 66%), as long as broad, tapering distally, apical margins concave, apical conical extension reaching at least halfway along longest seta, without dorsal robust setae, with apical/subapical robust setae, each lobe with 6 long apical robust setae, without robust setae on outer or inner margins.

**Female** (sexually dimorphic characters). Based on paratype, female, 9.1 mm, AM P62996. *Gnathopod 2* basis slender; merus acutely produced distoventrally; length 1 x breadth, not enclosed by merus and propodus; propodus expanded, with setae along posterior margin, palm acute with well defined corner, convex, smooth, without distomedial shelf, with sparse robust setae, without teeth along margin, without posteroventral corner, with posterodistal robust setae; apically acute, without posteroproximal shelf. *Pereopods 5–7* carpus broadened.

**Habitat.** Marine, epibenthic, living among algae.

**Remarks.** These are the first records of the distinctive species *M. chandaniae* since the original description (Lowry & Springthorpe 2005) and indicate that *M. chandaniae* occurs throughout tropical Australia. The species is distinguished from all other species of *Mallacoota* by the massive second gnathopod of the male with the nearly transverse palm, large palmar teeth and extensive setal bunch.

**Distribution.** *Australia.* Northern Territory: Darwin; Beagle Gulf; Gove Harbour; Bynoe Harbour; Shell Islands (current study). Queensland: Lucinda; Weipa (Lowry & Springthorpe, 2005); Torres Strait: Number One Reef, north of Horn Island (current study).

### ***Mallacoota nananui* Myers, 1985**

(Figs 21, 22)

*Mallacoota subcarinatus*. —Ledoyer, 1984: 72, fig. 34.

*Mallacoota nananui* Myers, 1985: 121, fig. 95. —Myers, 1986a: 1389, fig. 8. —Myers, 1986b: 277, fig. 8. —Springthorpe & Lowry, 1994: 26 (catalogue). —Lowry & Springthorpe, 2005: 267.

**Material examined.** 2 unsexed, AM P78037 (QLD 1319); 4 unsexed, AM P75755 (QLD 1909); 1 unsexed, AM P75621 (QLD 1916); 1 unsexed, AM P75754 (QLD 1917); 2 unsexed, AM P75753 (QLD 1983); 2 unsexed, AM P75752 (QLD 1985); 1 male, 9.0 mm, 5 slides, AM P78036 (QLD 1986); many unsexed, AM P75629 (QLD 1986); 7 unsexed, AM P75630 (QLD 2000); many unsexed, AM P75631 (QLD 2004).



**Type locality.** Nananui Ra, Viti Levu, Fiji (~17°18'S 178°13'E).

**Description.** 1 male, 9.0 mm, AM P78036.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, with 1 robust seta along posterior margin; article 2 longer than article 3; accessory flagellum short, with 5 articles; flagellum with 22 articles. *Antenna 2* peduncular article 4 longer than article 5; flagellum with 9 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 3 setae; palp reduced, 3-articulate; article 1 about as long as broad, shorter than article 2, inner margin article 1 not produced distally; article 2 subequal to article 3; article 3 long (more than 3 x as long as broad), rectilinear, longer than article 1.

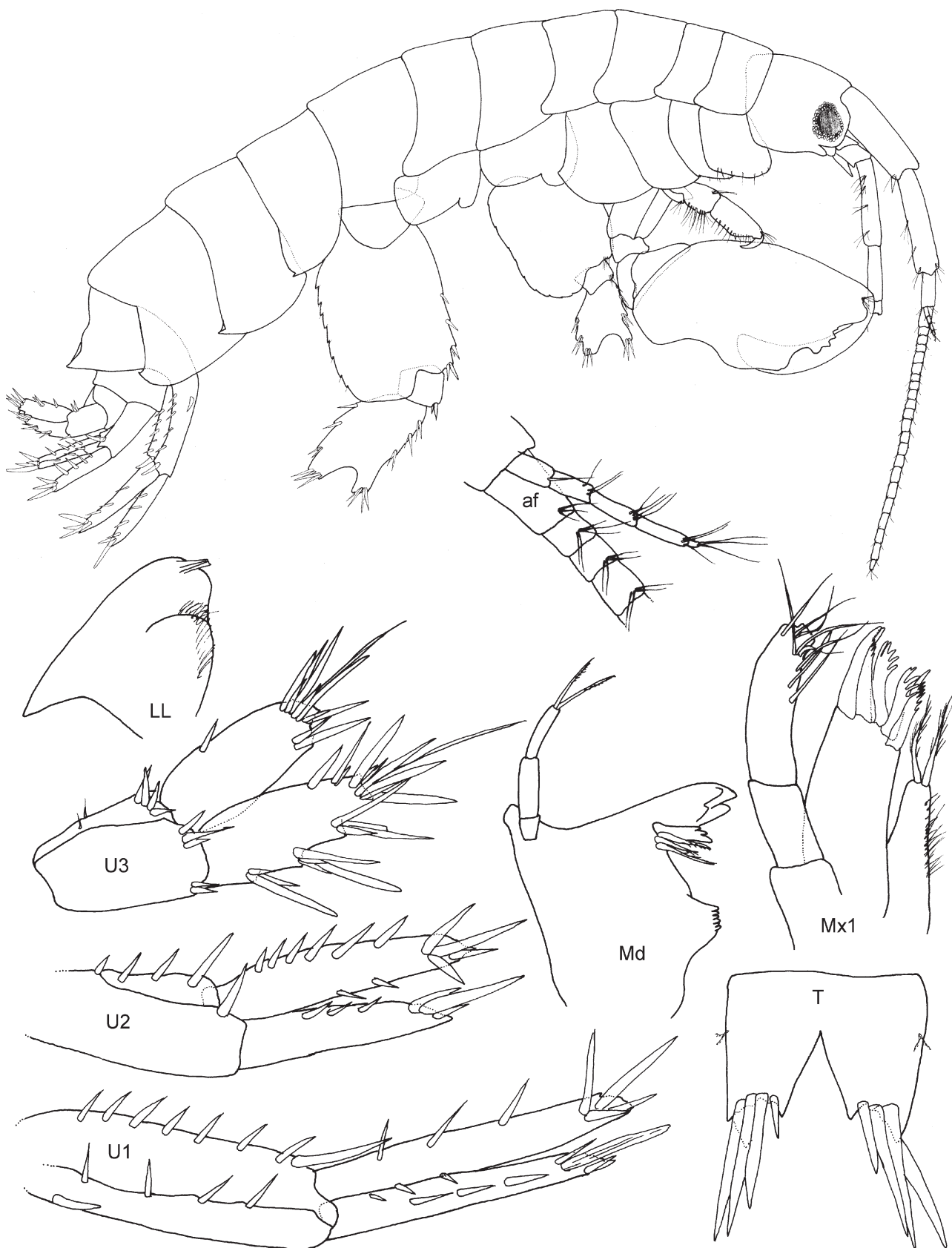
**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, subequal in length to propodus (length 0.9 x propodus), setae in anterodistal bunches and along posterior margin; propodus palm acute, convex, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus with rounded distoventral corner; carpus compressed, projecting between merus and propodus, length 0.5 x breadth; propodus massive, without setal bunches along grossly sinusoidal posterior margin, palm acute, sinusoidal, sculptured, palm about half length of propodus, with subquadrate distomedial shelf, without group of robust setae on shelf, with shallow midmedial excavation, palmar margin without robust setae, without teeth along margin, subpalmar surface smooth, defined by posteroventral corner, without posterodistal robust setae; dactylus reaching end of palm, closing across margin of palm, without setae on anterior margin, without posteroproximal shelf, apically truncated, hammer-like. *Pereopods 5–7* broad distally. *Pereopod 4* coxa posteroventral lobe slightly developed, with subacute posteromedial corner. *Pereopod 5* basis expanded, posterior margin straight, without long slender setae, posteroventral corner broadly rounded. *Pereopod 6* basis posterior margin straight, without long slender setae, posteroventral corner produced distally, lobate; carpus and propodus with few long, slender setae along anterior margin; merus and carpus broadened; propodus expanded posterodistally to form a hood-like projection. *Pereopod 7* basis posterior margin convex, smooth or minutely castelloserrate, without long slender setae, produced posterodistally (lobate), posteroventral corner broadly rounded; merus and carpus broadened; propodus expanded posterodistally to form a hood-like projection.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner with small acute or subacute spine. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute spine. *Urosomite 1* bicarinate, subtriangular. *Urosomites 2–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long; inner ramus subequal in length to outer ramus; inner ramus short (length 1 to 1.9 x breadth); outer ramus long (length 2.4 x breadth), subequal to peduncle, 1-articulate. *Telson* moderately cleft (30 to 65%), broader than long, tapering distally, apical margins concave, apical conical extension reaching at least halfway along longest seta, without dorsal robust setae, each lobe with 4 long and short apical robust setae, without robust setae on inner and outer margins.

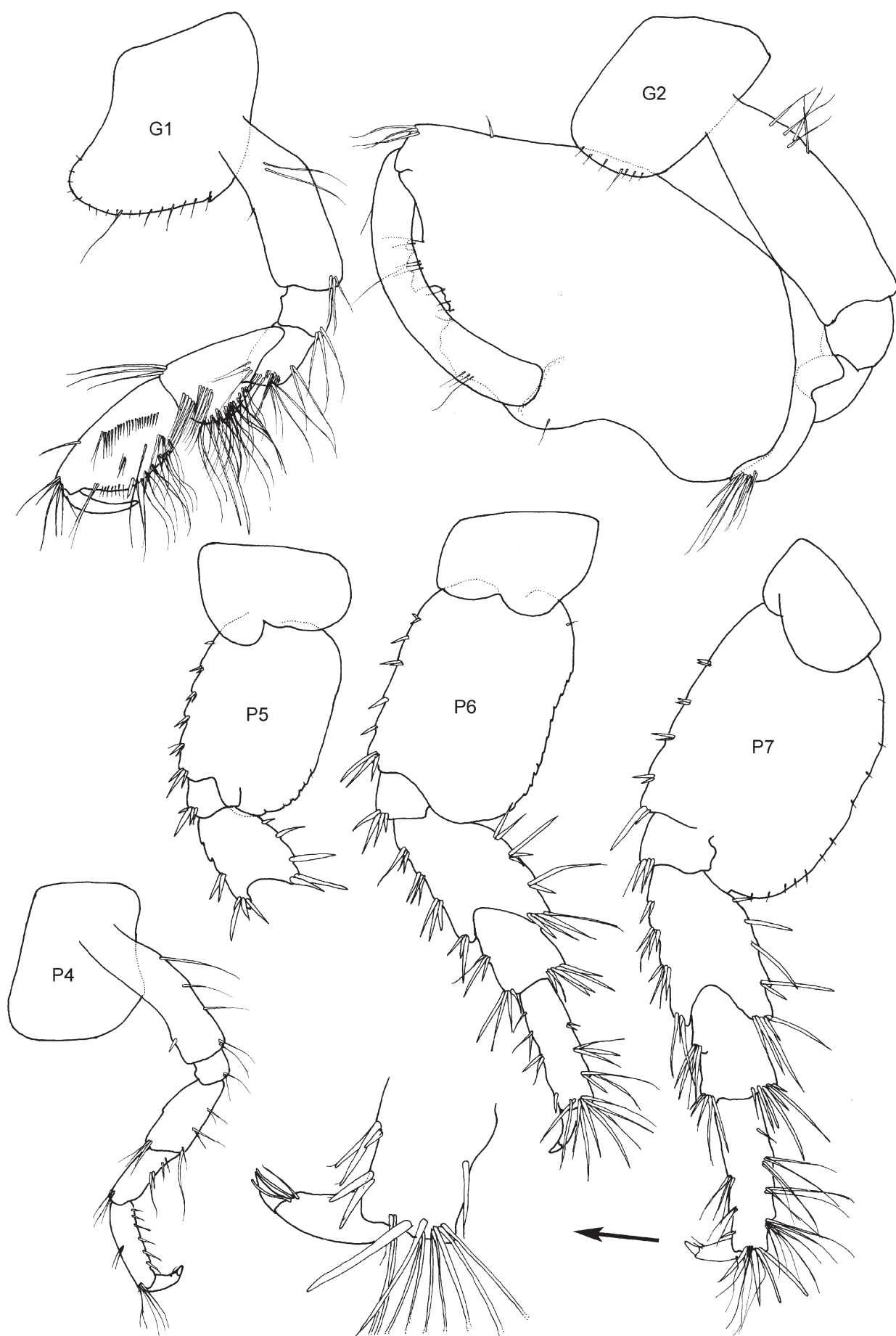
**Habitat.** Marine, epibenthic, littoral (1.5 – 3 m), on green algae, *Halimeda* and *Caulerpa*, on red and brown algae.

**Remarks.** Myers (1986b: 277, fig. 8b) considered that the reports of *M. subcarinata* from New Zealand (Chilton 1915; J.L. Barnard 1972b) and from New Caledonia (Ledoyer 1984) were *M. nananui*. But the toothed corner and straight posterior margin of the male gnathopod 2 propodus and lack of a basofacial seta on the peduncle of uropod 1, indicates that the New Zealand records represent an unnamed species that is more similar to *M. latidactylus* Ledoyer, 1983. The report of *M. subcarinata* (phénotype de l'herbier) by Ledoyer (1984) from intertidal seagrasses at l'îlot Maître, New Caledonia appears to be *M. nananui*.

*Mallacoota nananui* is a distinctive species that can be differentiated from other species on the GBR by the massive propodus on the male second gnathopod with its characteristic sinusoidal posterior margin and hammer-like dactylus.



**FIGURE 21.** *Mallacoota nananui* Myers, 1985, male 8.0 mm, AM P78036, One Tree Island, Great Barrier Reef.



**FIGURE 22.** *Mallacoota nananui* Myers, 1985, male 8.0 mm, AM P78036, One Tree Island, Great Barrier Reef.

**Distribution.** *Australia*. Queensland: Heron Island; One Tree Island (current study). New South Wales: Lord Howe Island (Lowry & Springthorpe 2005). *Fiji*: Viti Levu (Myers 1985). *New Caledonia*. I'îlot Maître (Ledoyer 1984). *Tonga*. (Myers 1986b).

***Mallacoota schellenbergi* Ledoyer 1984**

(Figs 23, 24)

? *Maera insignis*. —Schellenberg, 1938: 50, fig. 24.

*Mallacoota schellenbergi* Ledoyer, 1984: 69, fig. 33. —Appadoo, Myers & Fagoonee, 2002: 776, figs 6–9.

*Mallacoota subcarinata*. —Appadoo & Steele, 1998: 639.

**Material examined.** 1 male, 5.0 mm, 4 slides, AM P78038 (JDT/OPH 3b); 1 female, 4.2 mm, 1 slide, AM P78039 (JDT/OPH 3b); 1 male, 3 slides, AM P78040 (JDT/OPH 3b); 4 unsexed, AM P78041 (JDT/OPH 3b); 1 unsexed, AM P75623 (QLD 1938); 8 unsexed, AM P75624 (QLD 1942); 1 unsexed, AM P75625 (QLD 1967); many unsexed, AM P75626 (QLD 1988).

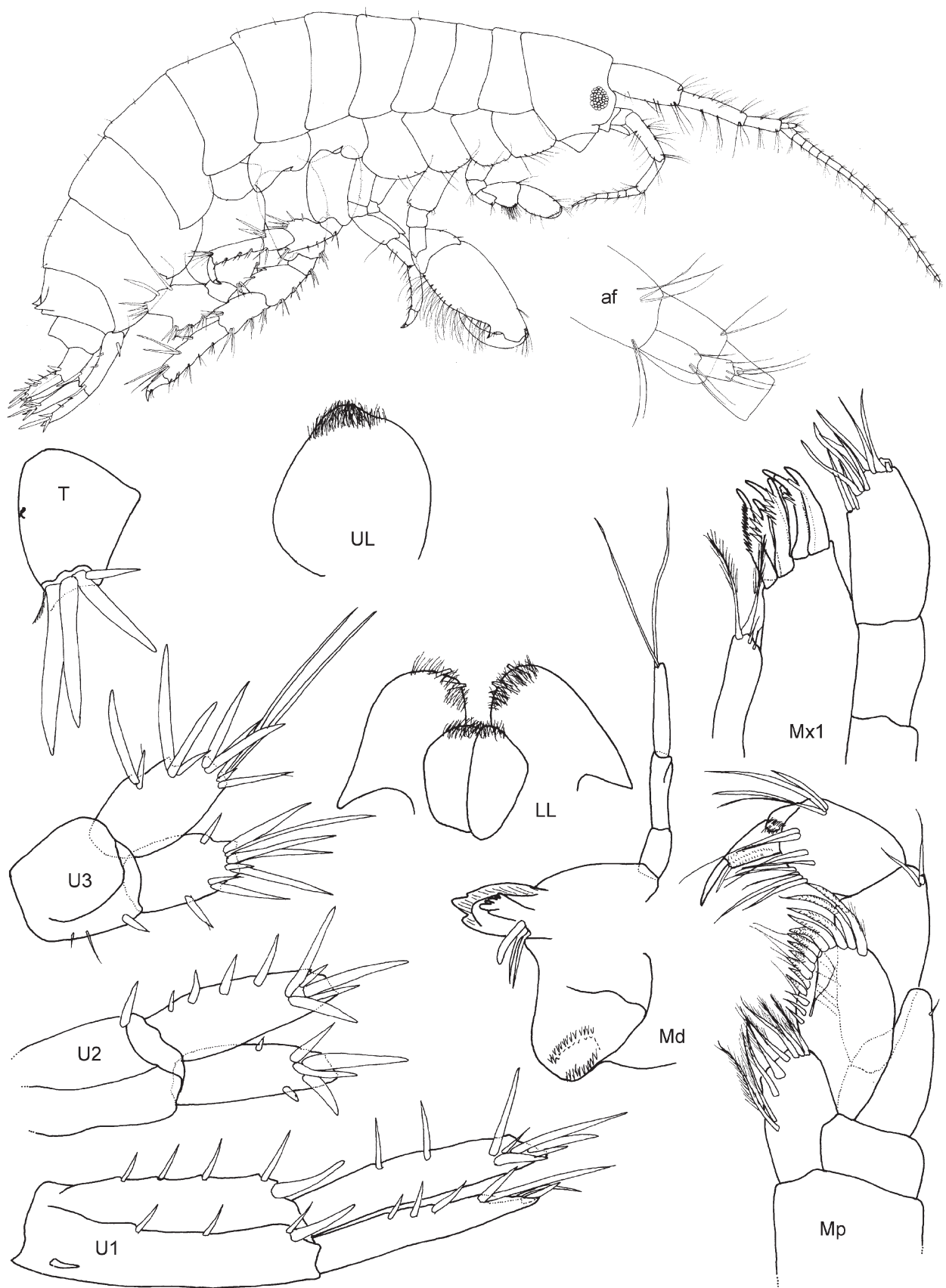
**Type locality.** I'îlot Maître, New Caledonia (~22°20'0"S 166°24'0"E).

**Description.** Based on 1 male, 5.0 mm, AM P78038.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with small ventral notch, anteroventral corner subquadrate. *Antenna 1* longer than antenna 2; peduncular article 1 slightly longer than article 2, without robust setae along posterior margin; article 2 longer than article 3; accessory flagellum short, with 3 articles; flagellum with 16 articles. *Antenna 2* peduncular article 4 longer than article 5; flagellum with 7 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 3 setae; palp reduced, 3-articulate; article 1 about twice as long as broad, shorter than article 2, inner margin article 1 not produced distally; article 2 shorter than article 3; article 3 long (more than 3 x as long as broad), rectolinear, article 3 longer than article 1.

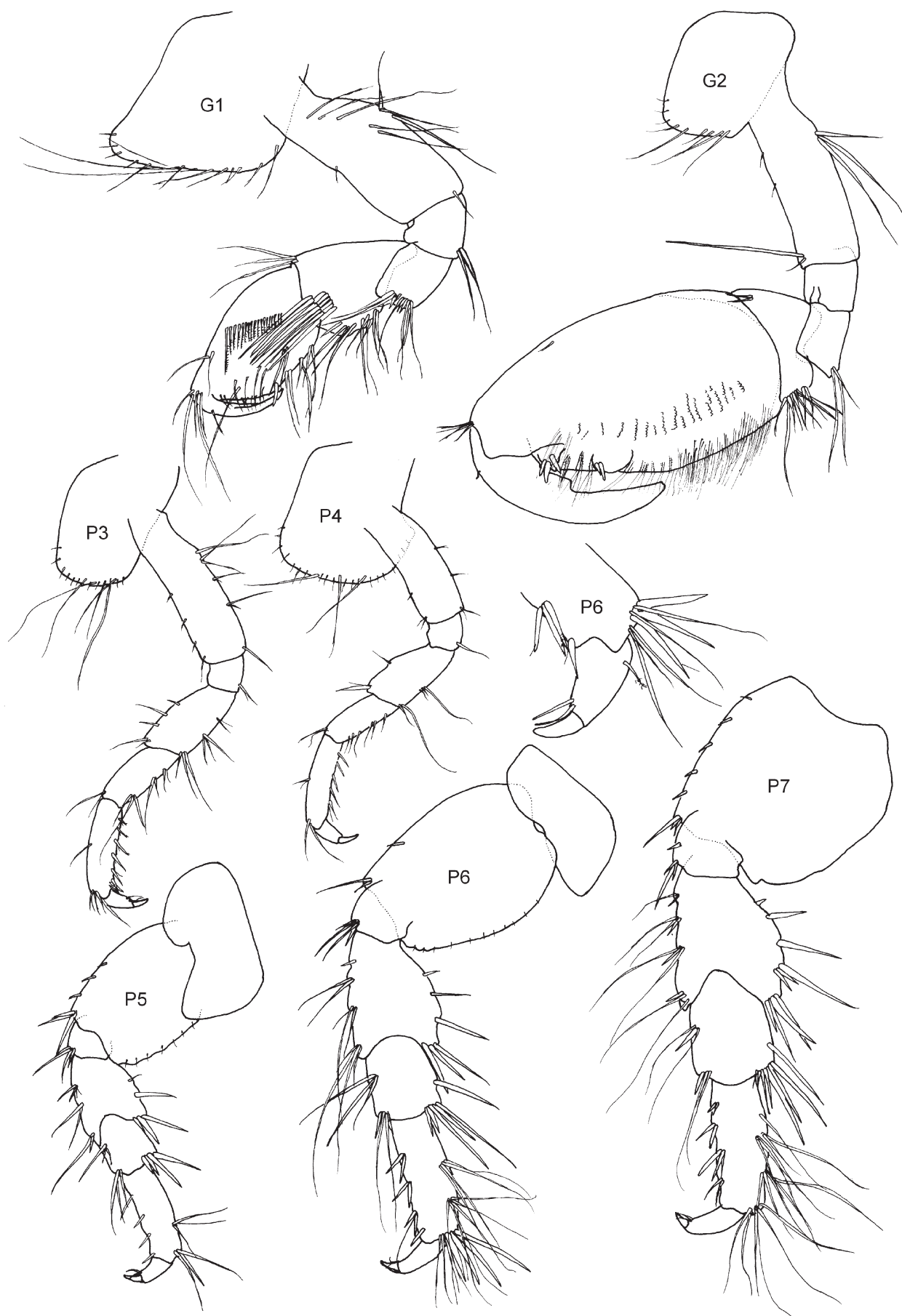
**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, carpus shorter than propodus (length 0.7 x propodus), setae in anterodistal bunches and along posterior margin; propodus palm acute, straight, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus acutely produced distoventrally; carpus compressed, projecting between merus and propodus, length 0.73 x breadth; propodus expanded, with setal bunches medially and along posterior margin, palm acute, smooth, with straight distomedial shelf, with group of 3 robust setae on shelf, palmar margin with 2 robust seta, without teeth along margin, with short proximal subpalmar seam forming rounded nodule, without posteroventral corner, without posterodistal robust setae; dactylus closing along palm, without setae on anterior margin, with posteroproximal shelf, apically subacute. *Pereopod 4* coxa posteroventral lobe slightly developed, with subquadrate posteromedial corner. *Pereopod 5* basis expanded, posterior margin convex, without long slender setae, posteroventral corner narrowly rounded; carpus and propodus with few long, slender setae along anterior margin. *Pereopod 6* basis posterior margin convex, without long slender setae, posteroventral corner narrowly subquadrate; carpus and propodus with few long, slender setae along anterior margin; merus and carpus broadened; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin convex, smooth, without long slender setae, not produced posterodistally, posteroventral corner subquadrate; merus and carpus broadened; propodus not expanded posterodistally.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 2* posteroventral corner acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with small acute tooth. *Urosomite 1* bicarinate, subtriangular. *Urosomites 2–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long; inner ramus shorter than outer ramus, short (length 1 to 1.9 x breadth); outer ramus short (length 1.8 x breadth), subequal in length to peduncle, 1-articulate. *Telson* deeply cleft (more than 66%), broader than long,



**FIGURE 23.** *Mallacoota schellenbergi* Ledoyer, 1984, male, 5.0 mm, AM P78038, Orpheus Island, Great Barrier Reef.





**FIGURE 24.** *Mallacoota schellenbergi* Ledoyer, 1984, male, 5.0 mm, AM P78038, female, 4.2 mm, AM P70839, Orpheus Island, Great Barrier Reef.

tapering distally, apical margins concave, outer apical conical extension reaching scarcely one third along longest seta, without dorsal robust setae, each lobe with 3 long and 1 short apical robust setae, without robust setae on inner or outer margins.

**Female** (sexually dimorphic characters). Based on female, 4.2 mm, AM P78039. *Gnathopod 2* carpus long, length 1.6 x breadth; without distomedial shelf, without robust setae along palm, with posterodistal robust setae; without posteroproximal shelf.

**Habitat.** Marine, epibenthic, intertidal algae.

**Remarks.** According to Ledoyer (1984) the material Schellenberg (1938) reported as *Maera insignis* may have been *M. schellenbergi*. Schellenberg had material from a wide range of localities in the Pacific Ocean including Hawaii, Fiji, Kiribati, Vanuatu and the Philippines. The material he illustrated and on which Ledoyer based his conclusion was from Kiribati.

*Mallacoota schellenbergi* is characterised by the male gnathopod 2 with dense rows of setae on the medial surface of the propodus, a lack of sculpturing on the palm, large, subpalmar nodules, and no posterodistal corner defining the palm. In most of these characteristics the propodus of male gnathopod 2 is similar to juvenile males of *M. subcarinata* (Haswell, 1879b) (see Lowry & Springthorpe 2005).

On the GBR *M. schellenbergi* is distinct from other species of *Mallacoota* by the relatively unsculptured palm of male gnathopod 2.

**Distribution.** *Australia*. Queensland: Orpheus Island (current study), One Tree Island (current study). *Kiribati*. (Schellenberg 1938). *Mauritius*. (Appadoo & Steele 1998; Appadoo *et al.* 2002). *New Caledonia*. Southwest Lagoon (Ledoyer 1984).

### ***Mallacoota scopulosa* sp. nov.**

(Figs 25, 26)

**Type material.** Holotype, 1 male, 7.3 mm, 4 slides, AM P78042, Steves bommie, near Two Trees Islet, outer reef, One Tree Island, Queensland (23°29.059'S 152°5.452'E), coral rubble with algae, 13.2 m, L.E. Hughes & J.K. Lowry, 27 October 2006 (QLD 1974). Paratype: 1 female, 7.7 mm, 1 slide, AM P78043 (QLD 1974); 1 unsexed, AM P78044 (JDT/LIZ 13); many unsexed, AM P75627 (QLD 1972); 5 unsexed, AM P75746 (QLD 1973); 2 unsexed, AM P75757 (QLD 1974); many unsexed, AM P75747 (QLD 1974); 7 unsexed, AM P75749 (QLD 1976); 2 unsexed, AM P75750 (QLD 1977); many unsexed, AM P75628 (QLD 1983); 1 unsexed, AM P75759 (QLD 2001); 12 unsexed, AM P75758 (QLD 2003).

**Type locality.** Steves bommie, near Two Trees Islet, outer reef, One Tree Island, Queensland (23°29.059'S 152°5.452'E), coral rubble with algae, 13.2 m.

**Etymology.** Named from the Latin 'scopulosa' for the hard rocky-rubble bottom where it is found.

**Description.** Based on holotype, male, 7.3 mm, AM P78042.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, rounded, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* peduncular article 1 subequal in length to article 2; accessory flagellum minute, with 2 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 3 setae; palp reduced, 3-articulate; article 1 about twice as long as broad, shorter than article 2, inner margin article 1 not produced distally; article 2 longer than article 3; article 3 short (about 3 x as long as broad), rectilinear, longer than article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, rounded, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, carpus subequal in length to propodus (length 1.2 x propodus), setae in anterodistal bunches and along posterior margin; propodus palm acute, straight, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus with rounded distoventral corner; carpus compressed, projecting between merus and propodus, length 0.8 x breadth; propodus expanded, without setal bunches along posterior margin, palm acute, convex, sculptured, palm about half length of propodus, with subtriangular distomedial

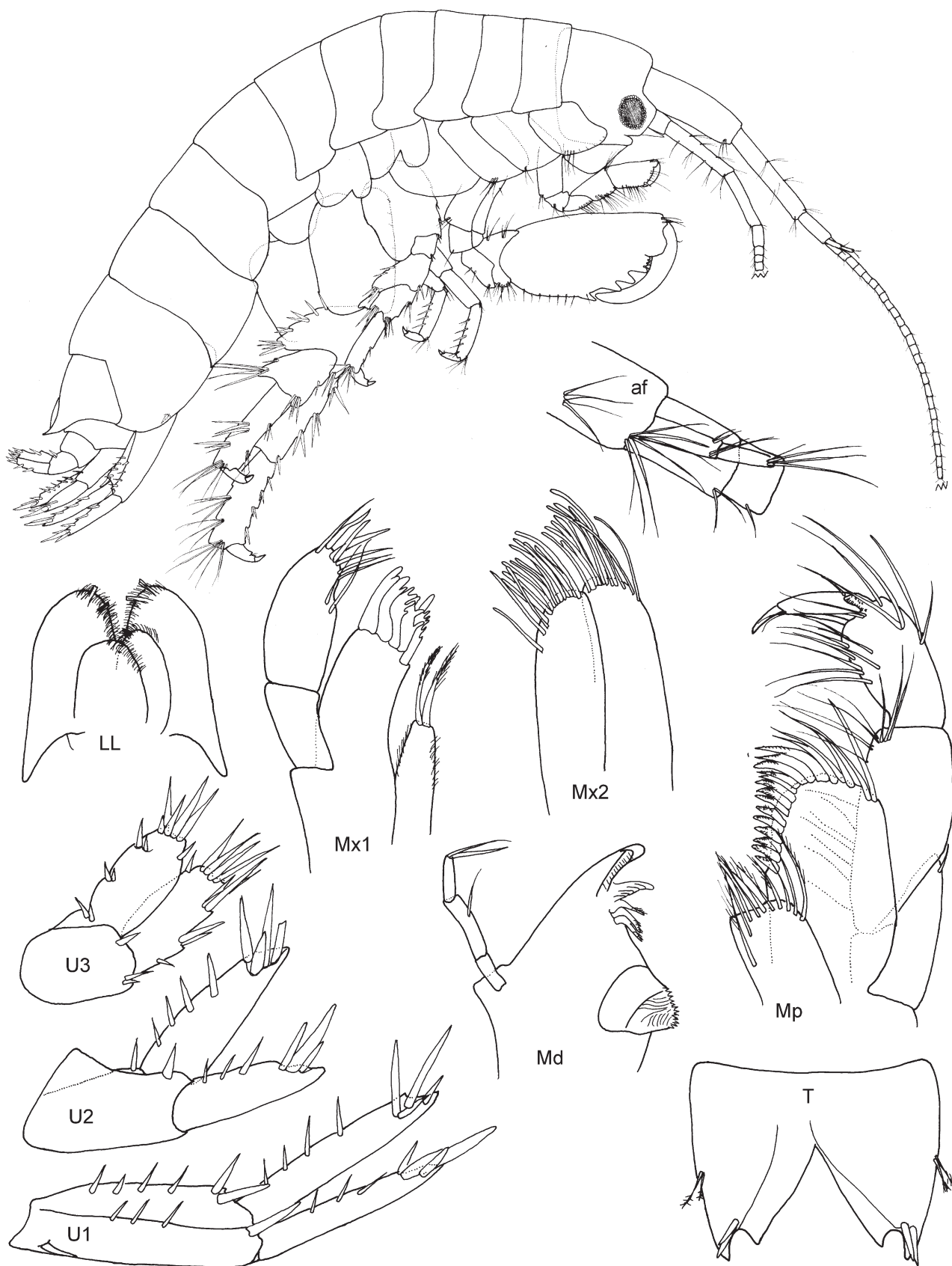
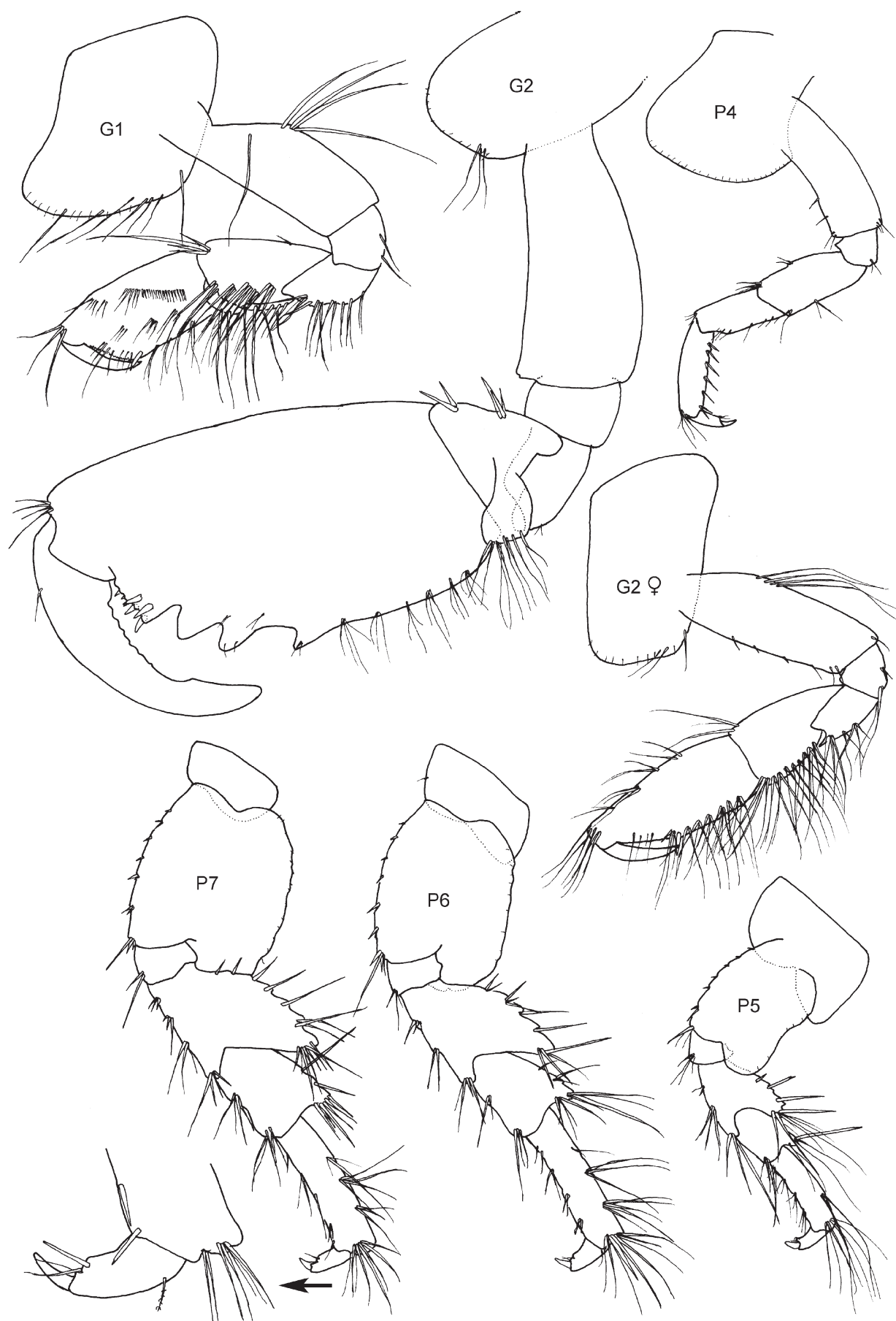


FIGURE 25. *Mallacoota scopulosa* sp. nov., male, 7.3 mm, AM P78042, One Tree Island, Great Barrier Reef.



**FIGURE 26.** *Mallacoota scopulosa* **sp. nov.**, male, 7.3 mm, AM P78042, female, 7.7 mm, AM P78043, One Tree Island, Great Barrier Reef.

shelf, with group of 6 robust setae on shelf, with midmedial excavation, palmar margin without robust setae, with 2 palmar teeth, subpalmar surface smooth, corner defined by posteroventral tooth, without posterodistal robust setae; dactylus reaching end of palm, closing along palm, without setae on anterior margin, with posteroproximal shelf, apically falcate. *Pereopod 4* coxa posteroventral lobe slightly developed, with rounded posteromedial corner. *Pereopod 5* basis expanded, posterior margin subsigmoidal, without long slender setae, posteroventral corner broadly rounded; carpus and propodus with few long, slender setae along anterior margin. *Pereopod 6* basis posterior margin straight, without long slender setae, minutely castelloserrate, posteroventral corner broadly rounded; carpus and propodus with few long, slender setae along anterior margin; merus and carpus broadened; propodus expanded posterodistally to form a hood-like projection. *Pereopod 7* basis posterior margin slightly convex, minutely castelloserrate, without long slender setae, not produced posterodistally, posteroventral corner broadly rounded; merus and carpus broadened; propodus expanded posterodistally to form a hood-like projection.

**Pleon.** *Pleonites 1–3* dorsally smooth, without setae, spines or carinae. *Epimeron 1* posteroventral corner with small acute spine. *Epimeron 2* posteroventral corner strongly produced, acute. *Epimeron 3* ventral margin smooth, posteroventral margin smooth, posteroventral corner with produced acute spine. *Urosomite 1* bicarinate, subtriangular. *Urosomites 2–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long; inner ramus subequal in length to outer ramus; inner ramus short (length 1 to 1.9 x breadth); outer ramus short (length 2 x breadth), subequal to peduncle, 1-articulate. *Telson* deeply cleft (more than 66%), broader than long, slightly tapering distally, apical margins concave, apical conical extension reaching at least halfway along longest seta, without dorsal robust setae, each lobe with 2 short apical robust setae, without robust setae on inner and outer margins.

**Female** (sexually dimorphic characters). Based on female, 7.7 mm, AM P78043. *Gnathopod 2* carpus long, length 1.7 x breadth, not enclosed by merus and propodus; straight, one third length of propodus, smooth, without distomedial shelf, with posterodistal robust setae; dactylus apically acute, without posteroproximal shelf.

**Habitat.** Marine, epibenthic.

**Remarks.** *Mallacoota scopulosa* is a large species, nearly twice the size of similar species such as the western Indian Ocean species *M. subinsignis* Ledoyer, 1979b and *M. magnimerus* Appadoo & Myers, 2006. It differs from *M. subinsignis* in the coxa of gnathopod 1 which has no posterodistal notch (well developed in *M. subinsignis*); in the palm of gnathopod 2 which has a well developed subtriangular shelf (oblique and weakly developed in *M. subinsignis*) two palmar teeth and a well developed corner tooth (one palmar tooth, a well developed corner tooth and a notch along the posterior margin in *M. subinsignis*); and in the dactylus of gnathopod 2 which is strongly falcate (apically acute in *M. subinsignis*). *Mallacoota magnimerus* is distinguished from *M. scopulosa* Appadoo & Myers, 2006 by its immensely broadened meri on pereopods 6–7. On the GBR only *M. scopulosa*, *M. chandaniae* and *M. capricornia* have the corner of the male gnathopod 2 palm defined by a tooth. Of these three species only *M. scopulosa* has a falcate tip on the dactylus of male gnathopod 2 and two short apical robust setae on each lobe of the telson.

**Distribution.** *Australia*. Queensland: Lizard Island; One Tree Island (current study).

### ***Pareiasmopus* Stebbing, 1888**

*Pareiasmopus* Stebbing, 1888: 1029. —Stebbing, 1906: 417. —J.L. Barnard, 1972a: 253 —Barnard & Barnard, 1983: 629, fig. 10. —Lowry & Stoddart, 2003: 185 (catalogue).

**Type species.** *Megamoera suensis* Haswell, 1879b, here selected (replacing *Gammarus suluensis* Dana, 1852).

**Included species.** *Pareiasmopus* includes 10 species: *P. albidus* (Dana, 1852); *P. echo* J.L. Barnard, 1972a; *P. dancaui* Ortiz & Lalana, 1997; *P. mallacootaformis* Ledoyer, 1984; *P. setiger* Chevreux, 1901; *P.*



*sowpigenensis* Lowry & Springthorpe, 2005; *P. suensis* (Haswell, 1879b); *P. suluensis* (Dana, 1852); *P. ya* J.L. Barnard, 1972a; *P. zelei* Ledoyer, 1983.

**Remarks.** Stebbing (1888) based the genus *Pareiasmopus* on *Gammarus suluensis* Dana, 1852. According to J.L. Barnard (1972a), Stebbing (1888) misidentified his material. Stebbing based his concept of *Pareiasmopus* on a species with a pair of dorsal spines on pereonite 7, but pereonite 7 is smooth in *P. suluensis*. At that time Barnard could not identify the species, but comparing Stebbing's (1888) illustrations with Berents' (1983) illustrations of the lectotype of *P. suensis*, it is clear that Stebbing had *P. suensis*. In reality Stebbing based his description of *Pareiasmopus* on *P. suensis*, using material from Challenger station 186, near Thursday Island, Torres Strait (10°30'S 142°18'E). According to ICZN (4<sup>th</sup> edition, 1999) Article 70.3.1, this species may be selected as the type species, replacing *Pareiasmopus suluensis* (Dana, 1852), originally chosen by Stebbing (1888).

***Pareiasmopus cymatilis* sp. nov.**  
(Figs 27, 28)

*Pareiasmopus echo*. —Berents, 1983: 136, fig. 27. —Lowry & Stoddart, 2003: 186 (in part).

**Type material.** Holotype, male, 10.5 mm (3 slides), AM P30155, fringing reef between Bird Islet and South Island, Lizard Island (14°40'S 145°28'E), *Halophila*, mixed algae and sediment from seagrass beds on reef base, 27.6 m, J.K. Lowry & P.C. Terrill, 9 October 1978 (QLD 28). Paratypes: 1 unsexed, AM P30154 (76 LIZ B); 1 unsexed, AM P78552 (QLD 28); 1 unsexed, AM 30156 (QLD 30); 4 unsexed, AM 30157 (QLD 50); 2 unsexed, AM 30158 (QLD 52).

**Additional material examined.** 1 unsexed, AM P78064 (JDT/LIZ 3j); 1 unsexed, AM P78063 (JDT/LIZ 5d); 1 unsexed, AM P78062 (JDT/LIZ 14c); 1 unsexed, AM P78057 (QLD 1833); 1 unsexed, AM P78197 (QLD 1869); 1 unsexed, AM P78061 (QLD 1886); 2 unsexed, AM P78056 (QLD 1888); 1 unsexed, AM P78059 (QLD 1891); 10 unsexed, AM P78046 (QLD 1893); 2 unsexed, AM P78060 (QLD 1897); 6 unsexed, AM P78045 (QLD 1902); 2 unsexed, AM P78050 (QLD 1903); 1 unsexed, AM P78047 (QLD 1904); 1 unsexed, AM P78049 (QLD 1905); 4 unsexed, AM P78052 (QLD 1909); 11 unsexed, AM P78048 (QLD 1914); 1 unsexed, AM P78058 (QLD 1915); 11 unsexed, AM P78054 (QLD 1916); 2 unsexed, AM P78053 (QLD 1917); 4 unsexed, AM P78055 (QLD 1918); 1 unsexed, AM P78051 (QLD 1920); 3 unsexed, AM P75764 (QLD 1950); many unsexed, AM P75761 (QLD 1981); 2 unsexed, AM P75762 (QLD 1982); 2 unsexed, AM P75748 (QLD 1994); 2 unsexed, AM P75865 (QLD 1994); 2 unsexed, AM P78301 (NT 324); 1 unsexed, AM P78302 (NT 327); 1 unsexed, AM P78304 (NT 345) 3 unsexed, NTM Cr001106 (MAGNT 1); 10+ unsexed, NTM Cr004907 (MAGNT 3); 10+ unsexed, NTM Cr004961 (MAGNT 4); 3 unsexed, NTM Cr015915 (MAGNT 4); 1 unsexed, NTM Cr005030 (MAGNT 5); 5+ unsexed, NTM Cr007810 (MAGNT 6); 3 unsexed, NTM Cr011666 (MAGNT 8); 1 unsexed, NTM Cr011656 (MAGNT 11); 6 unsexed, NTM Cr015566 (MAGNT 14); 6 unsexed, NTM Cr015701 (MAGNT 15); 12 unsexed, NTM Cr015662 (MAGNT 15); 5 unsexed, NTM Cr015695 (MAGNT 16); 1 unsexed, NTM Cr015548 (MAGNT 17); 1 unsexed, NTM Cr015560 (MAGNT 17); 3 unsexed, NTM Cr015624 (MAGNT 17); 19 unsexed, NTM Cr015648 (MAGNT 17); 3 unsexed, NTM Cr015597 (MAGNT 17); 2 unsexed, NTM Cr015637 (MAGNT 17); 2 unsexed, NTM Cr015641 (MAGNT 17); 7 unsexed, NTM Cr015539 (MAGNT 18); 1 unsexed, NTM Cr015553 (MAGNT 18); 1 unsexed, NTM Cr015577 (MAGNT 18); 5 unsexed, NTM Cr015587 (MAGNT 18); 8 unsexed, NTM Cr015608 (MAGNT 18); 5+ unsexed, NTM Cr015666 (MAGNT 18); 3 unsexed, NTM Cr013559 (MAGNT 22); 1 unsexed, NTM Cr013570 (MAGNT 23); 2 unsexed, NTM Cr015903 (MAGNT 24); 3 unsexed, NTM Cr013916 (MAGNT 25); 1 unsexed, NTM Cr016758 (NS055); 12 unsexed, NTM Cr015894 (WA location); 9 unsexed, NTM Cr015911 (WA location). 3 unsexed, NTM Cr016752 (MAGNT 38); 5 unsexed, NTM Cr016760 (MAGNT 36); 7 unsexed, NTM Cr016759 (MAGNT 39); 3 unsexed, NTM Cr016757 (MAGNT 6); 3 unsexed, NTM Cr016755 (MAGNT 33).

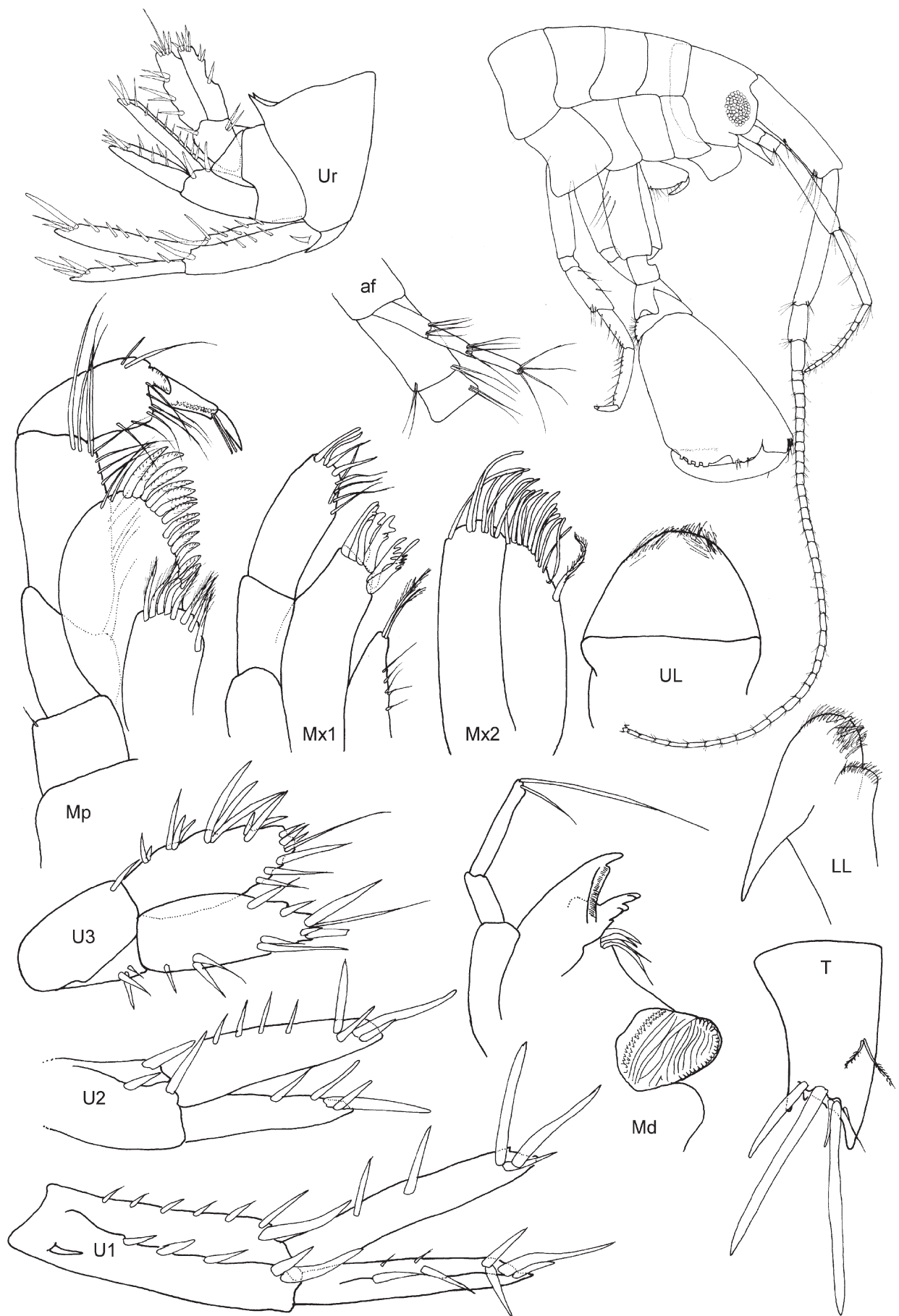
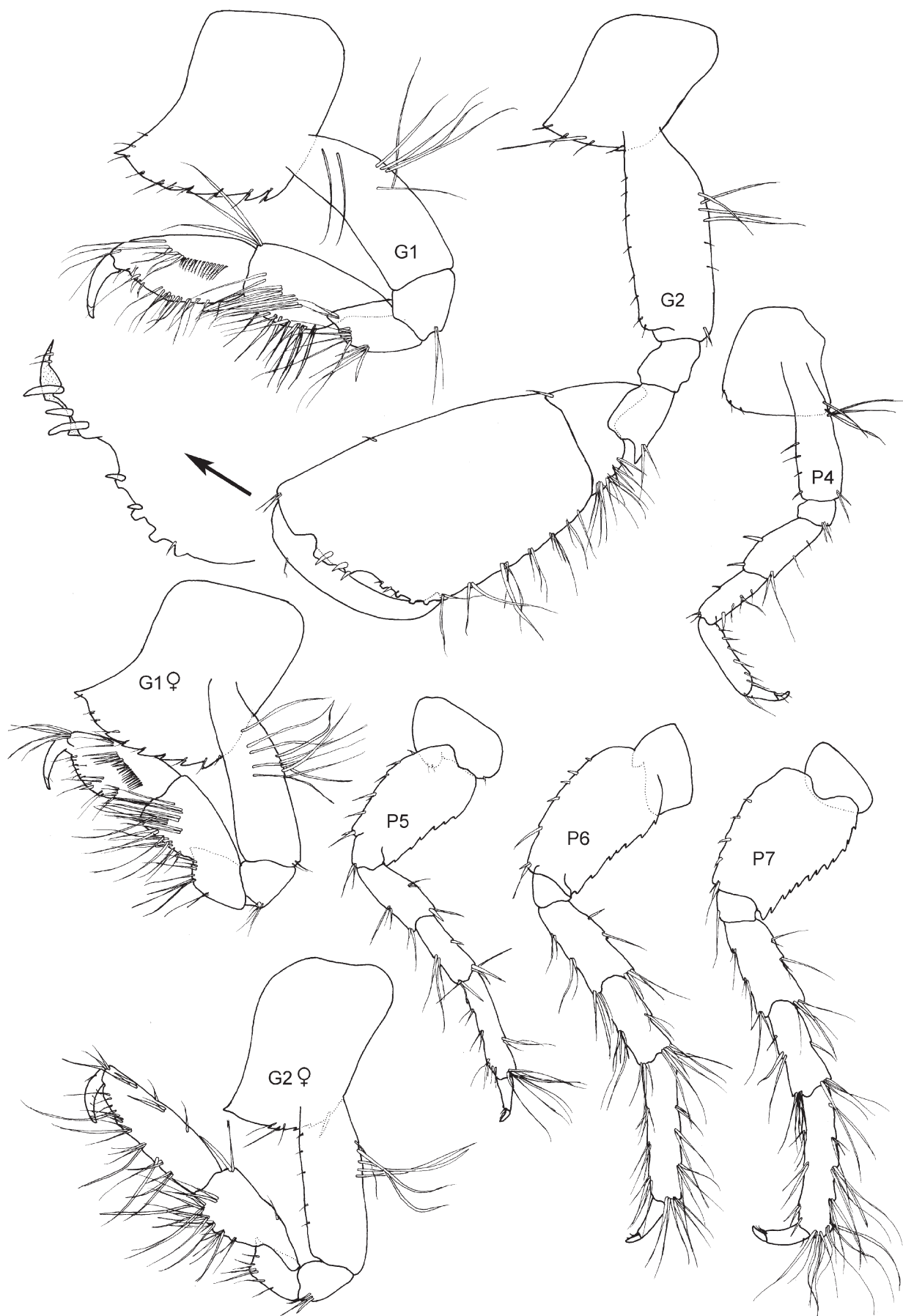


FIGURE 27. *Parelasmopus cymatilis* sp. nov., holotype, male, 10.5 mm, AM P30155, Lizard Island, Great Barrier Reef.



**FIGURE 28.** *Parelasmopus cymatilis* **sp. nov.**, holotype, male, 10.5 mm, AM P30155, paratype, female, 5.0 mm, AM P30155, Lizard Island, Great Barrier Reef.

**Type locality.** Fringing reef between Bird Islet and South Island, Lizard Island (14°40'S 14528'E).

**Etymology.** Named from the Latin 'cymatilis' meaning sea-coloured, blue. This is in reference to the type locality which is near the Blue Lagoon.

**Description.** Based on holotype, male, 10.5 mm, AM P30155.

**Head.** *Head* eyes ovate; lateral cephalic lobe broad, rounded, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 slightly shorter than article 2, without robust setae along posterior margin; article 2 longer than article 3; flagellum with 37+ articles. *Antenna 2* peduncular article 4 longer than article 5; flagellum with 9 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 4 setae; palp reduced, 3-articulate; article 1 at least 3 x as long as broad, longer than article 2, inner margin article 1 curved, swollen distally; article 2 shorter than article 3; article 3 long (more than 3 x as long as broad), rectilinear, shorter than article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, acute, anterior margin concave, ventral margin serrate; merus with posterodistal tooth; carpus about 2 x as long as broad, subequal in length to propodus (length 1 x propodus), setae in anterodistal bunches along posterior margin; propodus palm acute, slightly convex, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch present; basis slender; merus acutely produced distoventrally; carpus compressed, not enclosed by merus and propodus, length 1 x breadth; propodus expanded, with slender setae along posterior margin, palm nearly transverse, concave, sculptured, palm about half length of propodus with straight distomedial shelf, with group of 3 robust setae on shelf, with midmedial excavation, palmar margin with sparse robust setae along palm, with 4 subacute teeth along margin, subpalmar surface smooth, defined by posteroventral corner, without posterodistal robust setae; dactylus reaching end of palm, closing along palm, without setae on anterior margin, without posteroproximal shelf, apically subacute. *Pereopod 4* coxa posteroventral lobe absent, posterior margin concave. *Pereopod 5* basis slightly expanded, posterior margin slightly concave, without long slender setae, posteroventral corner serrate; carpus and propodus with few long, slender setae along anterior margin. *Pereopod 6* basis posterior margin slightly concave, without long slender setae, posteroventral corner slightly serrate; carpus and propodus with many long, slender setae along margins; merus and carpus not broadened; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin subsigmoidal, serrate, without long slender setae, not produced posterodistally, posteroventral corner with acute or subacute process; merus and carpus not broadened; capus and propodus with long slender setae; propodus not expanded posterodistally. *Pereonite 7* with pair of dorsal spines.

**Pleon.** *Pleonites 1–2* each with pair of dorsal spines. *Pleonite 3* dorsally bicarinate. *Epimeron 1* posteroventral corner with small acute or subacute spine. *Epimeron 3* ventral margin serrate distally, posteroventral margin serrate below posteroventral corner, posteroventral corner with small acute spine. *Urosomite 1* bicarinate, subtriangular. *Urosomites 2–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long and short; inner ramus subequal in length to outer ramus; outer ramus longer than peduncle, long (length 3 x breadth), 1-articulate. *Telson* deeply cleft (more than 66%), lobes truncated with apical cusps, apical conical extension reaching scarcely one third along longest seta, without dorsal robust setae, each lobe with 4 long and short apical robust setae, without robust setae on inner or outer margins.

**Habitat.** Marine, epibenthic, living in *Halophila*, mixed algae and sediment from seagrass beds on reef base at about 27 m depth.

**Remarks.** *Parelasomopus cymatilis* **sp. nov.** was originally identified by Berents (1983) as *P. echo* J.L. Barnard, 1972a. It differs most obviously from *P. echo* by the shape of the palm of gnathopod 2. In *P. cymatilis* **sp. nov.** it is broadly rounded with four distinct cog-like spines whereas *P. echo* is spine-less. As specimens mature the corner of the palm becomes a rigid plateau and the cog-like spines become less pronounced. The dactylus closes onto a flat, heavily calcified platform. *Parelasomopus suensis*, which also occurs on the GBR, can be distinguished from *C. cymatilis* by its transverse palm. *Parelasomopus cymatilis* **sp. nov.** is apparently endemic to tropical Australia.



**Distribution.** *Australia*. Northern Territory: Darwin Harbour (current study). Queensland: Lizard Island (Berents 1983, current study); One Tree Island (current study).

***Pareiasmopus suensis* (Haswell, 1879b)**

(Figs 29, 30, Pl. 4G)

*Megamoera suensis* Haswell, 1879b: 335, pl. 21, fig. 5. —Miers, 1884: 3, 17–3 18. —Springthorpe & Lowry, 1994: 32 (catalogue).

*Megamoera haswelli* Miers, 1884: 318 [text name].

*Pareiasmopus suluensis*. —Stebbing, 1888: 1029, pl. 100. —Stebbing, 1906: 417 (in part).

*Elasmopus suensis*. —Stebbing, 1906: 442.

*Pareiasmopus suensis*. —J.L. Barnard, 1974: 143. —Berents, 1983: 138, figs 28, 29. —Lowry & Stoddart, 2003: 186 (catalogue).

Not *Megamoera suensis*. —Haswell, 1885: 103, pl. 15 : figs 1–4 [= *Lingumaera hamigera* (Haswell, 1879b) fide Stebbing, 1906, but see Stebbing, 1910: 600].

**Material examined.** 1 unsexed, AM P78066(76 LIZ B 12.21.2); 1 unsexed, AM P70570 (QLD 1621); 3 unsexed, AM P70597 (QLD 1622); 1 unsexed, AM P71499 (QLD 1823); 1 unsexed, AM P70646 (QLD 1634); 1 unsexed, AM P70820 (QLD 1670); 1 male, 10.0 mm, 4 slides, AM P78065 (QLD 1698); 1 female, 10.0 mm, 3 slides, AM P70939 (QLD 1698); 8 unsexed, AM P71146 (QLD 1707); 1 male, 4 slides, AM P78343 (QLD 1710); 1 unsexed, AM P71055 (QLD 1717); 2 unsexed, AM P71101 (QLD 1718); 2 unsexed, AM P71387 (QLD 1827); 1 unsexed, AM P71555 (QLD 1828); 1 unsexed, AM P71473 (QLD 1830); 1 unsexed, AM P71447 (QLD 1833); 10 unsexed, AM P78300 (NT102); 2 unsexed, AM P78303 (NT344); 2 unsexed, NTM Cr011658 (MAGNT 9); 1 male specimen dissected, 4 slides, NTM Cr016751 (MAGNT 9); 1 unsexed, NTM Cr015627 (MAGNT 17); 1 unsexed, NTM Cr011701 (MAGNT 34).

**Type locality.** Sue Point, Sue Island (Warraber), Torres Strait, Queensland, Australia (~1013'0"S 14249'0"E).

**Description.** Based on male, 10.0 mm, AM P78065.

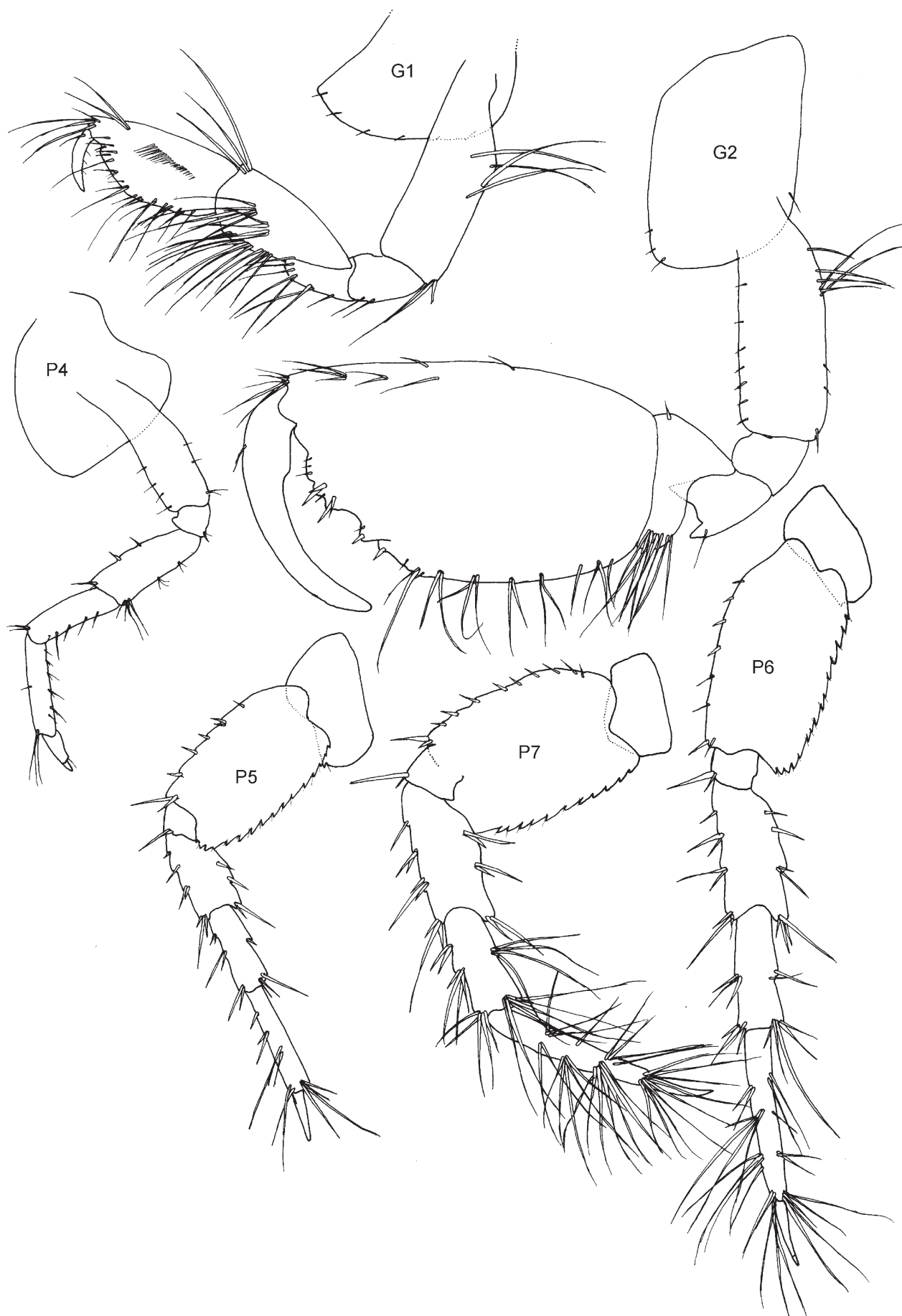
**Head.** *Head* eyes ovate; lateral cephalic lobe broad, truncated, anteroventral margin with notch/slit, anteroventral corner rounded. *Antenna 1* longer than antenna 2; peduncular article 1 subequal in length to article 2, with 2 robust setae along posterior margin; article 2 longer than article 3; accessory flagellum short, with 4 articles; flagellum with 22+ articles. *Antenna 2* peduncular article 4 longer than article 5; flagellum with 9 articles. *Mandible* incisor a smooth cutting edge with 2 apicomedial cusps; accessory setal row with 3 setae; palp reduced, 3-articulate; article 1 at least 3 x as long as broad, longer than article 2, inner margin curved, slightly swollen distally; article 2 shorter than article 3; article 3 long (more than 3 x as long as broad), rectilinear, subequal to article 1.

**Pereon.** *Gnathopod 1* coxa anteroventral corner produced, acute, anterior margin concave; merus without posterodistal tooth; carpus about 2 x as long as broad, subequal in length to propodus (length 1 x propodus), setae in anterodistal bunches and along posterior margin; propodus palm acute, straight, entire, defined by posterodistal corner, with posterodistal robust setae. *Gnathopod 2* coxa posteroventral corner notch absent; basis slender; merus acutely produced distoventrally; carpus compressed, projecting between merus and propodus, length 0.75 x breadth; propodus expanded, with slender setae along posterior margin, palm acute, slightly convex, sculptured, palm about half length of propodus, without distomedial shelf, with group of 4 robust setae on shelf, with midmedial excavation, palmar margin with 2 sparse robust setae, without teeth along margin, subpalmar surface smooth, defined by posteroventral corner, without posterodistal robust setae; dactylus reaching end of palm, closing across margin of palm, without setae on anterior margin, with slight posteroproximal shelf, apically subacute. *Pereopod 4* coxa posteroventral lobe slightly developed, with rounded posteromedial corner. *Pereopod 5* basis slightly expanded, posterior margin slightly convex, without long slender setae, posteroventral corner with acute or subacute process; merus and carpus not broadened,





**FIGURE 29.** *Parelasmopus suensis* (Haswell, 1879b), male, 10.0 mm, AM P78039, Lizard Island, Great Barrier Reef.



**FIGURE 30.** *Parelasmopus suensis* (Haswell, 1879b), male, 10.0 mm, AM P70939, Lizard Island, Great Barrier Reef.

carpus and propodus, with few long, slender setae along anterior margin. *Pereopod 6* basis posterior margin slightly convex, without long slender setae, posteroventral corner narrowly rounded; merus and carpus not broadened, carpus and propodus, with many long, slender setae along margins; propodus not expanded posterodistally. *Pereopod 7* basis posterior margin straight, serrate, without long slender setae, produced posterodistally (slightly lobate), posteroventral corner narrowly rounded; merus and carpus not broadened; propodus not expanded posterodistally. *Pereonite 7* with pair of dorsal spines.

**Pleon.** *Pleonites 1–2* each with pair of dorsal spines. *Pleonite 3* dorsally bicarinate. *Epimeron 1* posteroventral corner with small acute or subacute spine. *Epimeron 2* posteroventral corner strongly produced, acute. *Epimeron 3* posteroventral margin serrate below posteroventral corner, posteroventral corner with strongly produced acute spine. *Urosomite 1* bicarinate, subtriangular. *Urosomites 2–3* dorsally smooth, without setae, spines or carinae. *Uropod 1* peduncle with basofacial robust seta. *Uropod 3* rami distally truncated, apical robust setae long; inner ramus subequal in length to outer ramus; inner ramus long (length 2 to 2.5 x breadth); outer ramus long (length 3 x breadth), longer than peduncle, 1-articulate. *Telson* deeply cleft (more than 66%), slightly broader than long, tapering distally, apical margins concave, outer apical conical extension reaching scarcely one third along longest seta, without dorsal robust setae, each lobe with 3 long and short apical robust setae, without robust setae on inner and outer margins.

**Habitat.** Marine, epibenthic, among reef rock and coral rubble.

**Remarks.** When J.L. Barnard (1972a) described *Parelasomopus ya*, *P. suensis* was poorly known. Berents (1983) redescribed *P. suensis* based on original types and we redescribe it here, based on new material. These two species are very similar. Differences include the anteroventral corner of the gnathopod 1 coxa which is acute in *P. suensis* and rounded in *P. ya*; pereopod 7 in *P. ya*, in which the basis is broader with a convex posterior margin and the distal articles have more long slender setae; and pleonite 3 which is dorsally smooth in *P. ya* and bicarinate in *P. suensis*.

The main difference between *P. cymatilis* and *P. suensis* is the shape of the male gnathopod 2 palm which has a weakly subacute palm and a series of small ‘cogs’ on the palmar corner in *P. cymatilis* (not present in *P. suensis*).

**Distribution.** *Australia*. Northern Territory: Darwin (current study). Queensland: Sue Island, Torres Strait (Haswell 1879b; Stebbing 1888); Lizard Island (Berents 1983; current study).

**TABLE 1.** Morphological differences between populations of *E. pecteniscrus*.

	Cephalic lobe	A1 peduncle article 1	Coxa 1 anterior margin	EP3 posteroventral corner	U3 inner ramus	Telson
Ledoyer 1982 Madagascar	rounded	without robust setae	straight	posteroventral corner subquadrate	shorter than outer	moderately cleft
J.L. Barnard 1970 Hawaii	truncated	--	--	posteroventral corner subquadrate	shorter than outer	deeply cleft
G. Karaman 1982 Mediterranean Sea	truncated	without robust setae	concave	posteroventral corner subquadrate	shorter than outer	moderately cleft
Appadoo & Myers 2003, Mauritius	rounded	without robust setae	straight	posteroventral corner subquadrate	shorter than outer	moderately cleft
Current study GBR	truncated	with 1 robust seta	concave	posteroventral corner with acute spine	½ length of outer	moderately cleft

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